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The Fiftieth Meeting of the American Astronomical Society

By DEAN B. McLAUGHLIN

On invitation of Professor Philip Fox, the American Astronomical Society held its fiftieth meeting at Chicago, June 22 to 24, in affiliation with the American Association for the Advancement of Science and A Century of Progress Exposition. By way of explanation of these two affiliations, it should be noted that the first meant that those who felt so inclined might pay one dollar registration fee, and the second meant that almost all had to pay fifty cents to attend each session, because the Planetarium is inside the Exposition grounds. Many were wise enough to avoid payment of the former fee, and they were not barred from any of the astronomical meetings. The admission fee of fifty cents was more difficult to escape. Father McNally displayed his Association badge, and one or two others may have gained entrance by whispering the word "syzygy" to one of the guards. The writer "crashed the gate" with neither badge, nor clerical collar, nor mystic language, but simply by impressing the authorities with his importance.

Headquarters of the Society were at the Stevens Hotel, and some astronomers who had made their reservations early and could pay the price obtained lodgings there. Some of the younger and less affluent members stayed at the Y.M.C.A. Hotel, conveniently close to the Stevens. The writer was one of this group and left his car in a parking lot which was visible from his window.

The first session of the Society, on Thursday morning, June 22, was held jointly with Section B of the Association and the American Physical Society. This session, held at International House on the University of Chicago campus, was a symposium on spectroscopy. The role of ionization theory in interpreting stellar spectra was presented in its broad features by Adams. This was followed by a discussion by Dunham of new instruments and methods in spectrophotometry. A. G. Shenstone spoke on "Atomic Configuration in Spectroscopy," and Struve summed up the present status of the problem of matter in interstellar space.

A lecture Thursday afternoon, by Niels Bohr on "Space and Time in Contemporary Physics" was attended by a crowd which taxed the capacity of the Illinois Host Building in the Exposition grounds. The writer can now say that he has attended a lecture by Bohr, but he must confess to having a single-track mind, because he alternately understood the

physics and the English, but never both simultaneously. This recalls an incident of the Cambridge meeting of the International Astronomical Union. After a delegate had given a discourse in German an interpreter rendered it in English. Of the two languages the German was the more intelligible.

Sessions for papers were only two in number and were held on Friday and Saturday mornings in a downstairs lecture room of the Planetarium, President Adams occupying the chair. The dedication of the room, which had never been used before, took place previous to the first session. The speech of dedication, by Professor Fox, was a model of brevity which others would do well to follow. As members of the Society entered the room the "music of the spheres" issued from a panel beside the platform. Later in the sessions this music had an uncanny way of starting without warning in the midst of a learned discourse on ionization potentials or other abstruse subject.

Speeches of welcome to the Society were made by Professor Fox, Mr. Max Adler, donor of the Planetarium, and Mr. Donoghue, representing the South Park Commissioners. The last named made the generous offer of a special dispensation for any members of the Society who might be arrested for traffic violations. Statistics as to those who availed themselves of this privilege are lacking as we go to press.

Professor Fox issued a request for old and decrepit instruments which might be placed in the Astronomical Museum, thus passing into "honorable retirement." One astronomer, whose name we shall not record here, offered the entire observatory with which he is connected, and with a little persuasion he would have included the observers and computers as well. As a result of the above request we may expect to see, in the near future, great numbers of meridian circles and chronographs on display in the Astronomical Museum. Domes which roll on cannonballs and which have shutters which open outward on hinges or slide back over the top of the dome are also suggested as being of value mainly as museum pieces.

The sessions were scheduled to begin at nine-thirty, but as the exposition grounds opened at that hour, and as the velocity of an astronomer is finite, the actual beginning was closer to ten o'clock. Doubtless the discussions were shorter than usual, and one cannot but regret the valuable sayings that were left unsaid in order to expedite the completion of the program. As it was, the Saturday morning session lasted well past noon.

No attempt will be made to mention all the papers presented at the meeting. Particularly indicative of the new directions in which astronomy is advancing were the papers on galactic rotation by Pearce and Plaskett, who studied the radial velocities of O and B stars, and by Joy who used faint Cepheids. Galactic rotation can now be regarded as an established fact, even though the distance to the center is in a controversial state. New results on the temperatures of Wolf-Rayet and Be

stars were presented by Beals and Mohler respectively. Pettit and Nicholson showed that the Mira stars emit the greatest total energy some time later than maximum of light. The distribution of dark matter in the galaxy was the subject of a paper by Stebbins and Huffer. Problems of classification of stellar spectra were discussed by Struve and by Beals. Of particular interest was the observation of prominences without a spectroscope, by Pettit and Slocum, who used a telescope similar to that with which Lyot observed the prominences and corona from Pic du Midi. Astronomers may soon find that their last excuse for round-the-world journeys has literally vanished in *thin air!*

At the business meeting Saturday morning the principal item was the election of officers. Those elected were: Shapley, vice president; Dugan, secretary; Jordan, treasurer; Duncan, Lampland, and Stetson, councilors. Slocum was elected to represent the Society on the National Research Council. Owing to the reorganization of that body it was necessary to re-elect those representatives already in office. This was done by unanimous vote. These representatives are H. N. Russell, H. D. Curtis, and J. A. Miller, whose terms expire in 1934, 1935, and 1936 respectively.

A prize of one thousand dollars, received by Miss Cannon from the Association to aid Scientific Work by Women was passed on by her to the Society, to be used to endow a fund for the awarding of prizes to women for research in astronomy. This Association was founded about 1890. Among the recipients of the prize it offered was Madam Curie. After the award to Miss Cannon the Association was disbanded. In a sense, however, it is continued, on a slightly modified basis, through the generosity of Miss Cannon. It was proposed by Miss Cannon that the award of the cash prize be accompanied by a brooch or pendant of some kind. The Council registered consternation at the idea that they, a body composed chiefly of mere men, should have to design a "doo-dad" of that character. By way of escape they delegated Miss Bigelow to confer with Miss Cannon and decide on an appropriate design.

A good attendance of members and guests was recorded, the number who signed the register being 93. The Council elected new members to the Society as follows:

Calder, William A., Harvard College Observatory, Cambridge, Mass.
Halpern, J. Laurence, Yerkes Observatory, Williams Bay, Wisconsin.
Hughes, Miss Emily M., Harvard College Observatory, Cambridge, Mass.
Hynek, Joseph Allen, Yerkes Observatory, Williams Bay, Wisconsin.
Lindsay, Eric M., Harvard College Observatory, Cambridge, Mass.
O'Connell, Daniel J. K., Harvard College Observatory, Cambridge, Mass.
Rudnick, Paul, Yerkes Observatory, Williams Bay, Wisconsin.
Pillans, Helen Mead, Yerkes Observatory, Williams Bay, Wisconsin.
Shaw, R. William, Rockefeller Hall, Cornell University, Ithaca, New York.
Walton, Wendell W., 2744 W. Buena Vista Avenue, Detroit, Michigan.
Williams, John D., 4182 University Station, Tucson, Arizona

The arrangement of the program left a reasonable amount of time for members to inspect the Exposition, although two afternoons and

evenings were hardly sufficient for more than a reconnaissance and the examination of a few selected areas. The physical and chemical processes and principles exhibited in the Hall of Science were especially interesting and instructive, even though elementary.

The buildings of the exposition equal anything conjured up in the imaginations of those who write of the inhabitants of Mars. The author is undoubtedly a benighted heathen, but he is unable to banish from his mind the suspicion that the designs of the buildings are the result of a series of bad dreams. By day they form a riot of color, but at night the color effects produced by the illumination are both striking and pleasing. In strong sunlight the exposition needs to be viewed through some absorbing medium,* and those who wish to look at the world through rose-colored glasses,—or any other color,—may purchase them from the vendors who literally infest the grounds. Less useful, but presumably salable articles are displayed in large quantities. Schemes to entrap the unwary dollar are everywhere rampant. Possibly this is a healthy sign; if people will spend money for such purposes the depression must be nearly at an end.

Another way of spending the vacant time was suggested by "invitations" received by the secretary from "an exclusive supper club, catering to the elite," and "the oldest established Country Cafe in the Chicago Area." The former "has overnight become the pet of debutantes and night-life lovers." This should have appealed strongly to astronomers. As for the other establishment: "Uniformed doormen whisk your car away to the parking spaces, beautiful cloak room attendants take charge of your wraps, . . . You dine incomparably, the show begins, life, gaiety, beautiful girls, a superb dance floor, rhythmic music, a sophisticated atmosphere, bring carefree joy." There was no mention of a cover charge.

The photograph of the Society was taken Friday noon, and with the arrival of the proof on Saturday, the frenzied efforts to identify faces, and portions of them, began. In the cause of the prevention of cruelty to secretaries, it is suggested that the appearance of a person in a group photograph and subsequent failure to reveal his identity should be made punishable by fine or imprisonment. One man did not know until after the picture had been taken that it was a group of astronomers, and he shall be forever nameless. Several of the younger men of the Society inquired as to the identity of the people on the balcony. The writer considers it a triumph of observation and inference that he identified one young lady in the picture, even though no part of her face was visible. This is at least as great an accomplishment as the reconstruction of the "Heidelberg Man" from a jawbone and a couple of teeth.

The Society dinner on Saturday evening was enjoyed at the Ferndale Inn at Williams Bay. Professor Fox characterized their dinners as "a

*For this purpose Jena 0:102 glass is suggested.

perfect gorge for a dollar." The after-dinner speeches were two in number, but they were delivered at the Yerkes Observatory, beginning about one-half hour after the conclusion of the dinner. There was thus ample opportunity for some members to escape if they so desired. Returning to the Observatory, the group assembled first around the balcony inside the 40-inch dome, and Director Struve spoke of the work of the telescope and the plans for the McDonald Observatory. The party then disbanded for a time to inspect various parts of the Observatory, and reassembled later in the library where refreshments were served and Mr. Moffitt exhibited and described the Littrow-type auto-collimating spectrograph used on the 69-inch Perkins telescope.

Some members of the Society stayed at Williams Bay overnight. Most of those who did not departed relatively early. What with a late hour of departure and the ailments which an ancient car can develop, the writer arrived in Chicago at the truly astronomical hour of four o'clock the next morning.

The visit to Yerkes Observatory concluded the Chicago meeting. The fifty-first meeting will be held at Cambridge during the Christmas holidays. We are assured that no admission fee will be charged, but the annual dues remain two dollars and are payable at any time.

With this, the third meeting he has reported, the writer is able to sympathize with those authors who are under contract to produce a specified volume of writings per unit time. To one accustomed to write up the results of research at leisure, it is something of a shock to have a definite date set for completion. It is suggested that some of the more irksome duties of the assistant secretary might be passed on to a second assistant secretary, "and so ad infinitum."

Matter in Interstellar Space[1]

By OTTO STRUVE

The purpose of this paper is to discuss some of the recent results which have been obtained at various observatories concerning the physical properties of matter in interstellar space. Some of the results have opened a new field of research in astrophysics. However, we have only made a beginning in the study of what Eddington has termed "the cosmic cloud" and many of our observations are extremely puzzling. Progress will depend upon the coöperation of the physicist and the astronomer.

For the convenience of presentation, the subject is divided into three sections: 1) the nebulae, 2) interstellar calcium, 3) interstellar dust.

[1] Part of a symposium on spectroscopy and astrophysics presented at the Chicago meeting of the American Physical Society and the American Astronomical Society, on June 22, 1933.

I.

Diffuse galactic nebulae have been known to astronomers since the 17th century. H. D. Curtis has estimated that there are approximately 1000 such objects in the sky and that the existing catalogues are fairly complete. The distances of these luminous areas in the sky range from about 900 light years for the famous Orion nebula to 4000 or more light years for some of the other nebulae. The great nebula in Orion connected with the four stars of the Trapezium covers approximately one square degree, while the faint outer nebulosities of Orion, photographed by Barnard and by Ross, cover one hundred or more square degrees and occupy practically the whole constellation of Orion. The diameter of the larger nebula in Orion is about 100 light years.

Another type of luminous nebula is presented by the planetaries, of which the Ring Nebula in Lyra is one of the most famous examples. They usually consist of rings or discs around a central star. Their appearance in the telescope has led to the rather unfortunate name of planetary nebulae.

The spectra of the diffuse nebulae have been investigated at the Lick Observatory and at other institutions. Most of them have emission lines of H, He I and II, O II, III, and IV, N II, III, and IV, C II, III, and IV, etc. The brilliant identification of the two nebular lines at 4959 and 5007 by Bowen, with forbidden lines of O III is so well known that I need not discuss it here. An important advance in the study of nebular spectra was made in 1932 by Edlén, when he succeeded in identifying emission lines of N IV and V and O V and VI. On the program of this meeting is a paper by Boyce, Menzel, and Miss Payne, in which new identifications of forbidden lines of Ne III, Ne IV, F II, F III, etc. are given. The full value of these identifications has not yet come to light, but the unexpectedly high state of excitation in the outer nebulosities of planetaries and related Wolf-Rayet stars and Novae is a matter of great interest. While not directly related to the subject of this symposium a recent paper by Miss Payne may be mentioned in which she identifies an absorption line of N V in the central stars of several southern planetaries. Since in a reversing layer the state of excitation is almost entirely dependent upon the temperature, Miss Payne was able to derive a temperature of 80,000° for these stars, thus providing the first direct proof of the high temperatures estimated indirectly from the emission lines by Zanstra and by Berman.

V. M. Slipher was the first who in 1912 announced that the spectrum of the nebula in the Pleiades was a true copy of that of the neighboring stars in the cluster. There were no emission lines, but the continuous spectrum photographed with small dispersion revealed the presence of absorption lines of H and He. Several other diffuse nebulae having continuous spectra were found by Slipher, and Hubble has since added several dozen to the list. It is Hubble's opinion that nebulae having continuous spectra may be more numerous than those having emission

spectra because of observational selection. Hubble also found that nebular light excited by a very hot star shows predominantly emission lines while that excited by a cooler star shows a continuous spectrum. The hypothesis advanced by Slipher and accepted with certain reservations by Hubble is that continuous nebular spectra originate from the reflection of light by the particles of the nebula.

Since nebulae emit light only in the vicinity of bright stars, it is reasonable to suppose that they exist as dark aggregations of matter in many parts of our Universe, where there are no bright stars. Indeed, Barnard has shown that many such dark nebulae can be seen projected upon the distant star-clouds of the Milky Way, and in some cases luminous nebulae gradually fade into dark markings, at greater distances from the exciting stars.

In 1920 Hubble and Seares announced the important discovery that the colors of 47 stars imbedded in nebulous matter were redder than might be expected from the character of the absorption lines. A year earlier Russell had called attention to the fact that "the three most abnormally yellow stars of type B (known at that time) lie within 5° of one another, in a region full of diffuse nebulosity." This would suggest that the particles in the nebula scatter light according to Rayleigh's law, but no further investigations on this interesting problem have been made until this spring. I will return to a discussion of this subject at the end of this paper.

II.

While diffuse nebulae in our galaxy have been known for a long time, the existence of a widely-spread tenuous cloud of gaseous matter enveloping all the stars of our Milky Way system was not suspected until much more recently.

In the years 1901-03 Hartmann observed a spectroscopic double star, δ Orionis, with the spectrograph of the Potsdam Astrophysical Observatory in Germany. This double star, which was originally discovered by Deslandres at Meudon, has a period of about 6 days, in the course of which the velocity of the brighter component, which alone is observable in a spectrograph, ranges from about 100 kilometers per second approach to 100 kilometers per second recession. The surprising thing discovered by Hartmann was that while the lines of H, He, and other elements gave consistent evidence of the motion of the binary, two faint lines of Ca II vapor remained stationary, just as if no motion at all were present. The precision of Hartmann's measurements left no doubt as to the truth of his discovery and it became therefore necessary to explain the stationary character of these two Ca lines. Since they must be produced by calcium gas which is stationary with respect to the sun this gas is not connected with either of the two components of the double star. It may form a local cloud around the double star as a whole, or it may form a concentric layer around our solar system or it may form a cloud between the binary and the sun, in interstellar space. Hartmann favored

the third interpretation which, as we shall see, is nearest to the truth.

In 1919 R. K. Young, then at Victoria, published a valuable summary of all existing observations of stationary Ca lines. Some of these observations have since been shown to be erroneous, but it was due to these that Young favored the first hypothesis of a cloud connected with the binary. J. S. Plaskett made an important advance in 1924 when he found that the velocities of systems of doubles, or of single stars, differed appreciably from the velocities of the calcium clouds and that consequently the stars were not permanently connected with the clouds. Eddington, in 1926, cleared up the whole problem when he proved theoretically that not only was there no reason to be alarmed at the production of lines of ionized calcium in the cold domains of interstellar space, but that in all probability calcium atoms in space would be so highly ionized that only one out of 1000 would be singly ionized and one out of 10^{11} would be neutral, while all the rest would be doubly ionized. The reason for this startling result is that there is a difference between the usual every-day idea of temperature and that which must be applied to interstellar space.

A black body placed in interstellar space would receive star light equivalent to about 2000 stars of the first magnitude, making a radiation density of about 10^{-13} ergs/cm^3. Stefan's law would give a temperature of about 3° above the absolute zero; but conditions in interstellar space are not those of thermo-dynamic equilibrium. Atoms will be photo-electrically ionized by the radiation of the stars, which, though extremely diluted, is relatively rich in ultra-violet light. The motions of the electrons expelled by the photo-electric ionizations will be determined by the frequency of the absorbed light, not by the general dilution of the radiation. Consequently the electrons will move with velocities corresponding to a temperature which is not very different from that of an average reversing layer and they will impress upon the atoms a similar distribution of velocities by the process of collisions. The crucial test of Eddington's hypothesis is that the intensity of the stationary lines must be a simple function of the distance. I succeeded in 1928 in amassing a large amount of material in support of just this kind of a correlation and my results have been confirmed and greatly expanded by the remarkable investigations of Plaskett and Pearce at Victoria.

The intensity of a stationary calcium line may be measured with a microphotometer. Comparing the contour thus derived with the contour produced by a known amount of calcium vapor in the laboratory, we can determine the total number of ionized calcium atoms between the observer and the star. For a star about ten or fifteen thousand light years away we find 10^{15} ionized calcium atoms in a column having a section of one square centimeter. Remembering that one out of 1000 calcium atoms is in the singly ionized state we conclude that the total number of calcium atoms in all stages of ionization is 10^{18}. If we make the assumption that the composition of matter in interstellar space is similar

to that of the earth we would have to multiply this result by 100 to get the total number of atoms of all elements. This leads to a density of something like 10^{-26} gr/cm^3.

It is difficult to comprehend a state of rarification in which there may be an atom or so per 100 cubic cm of space. What is not occupied by the atom itself must be "empty" and just what that means I will leave to the theoretical physicists to explain. I am not sure, however, that it is any easier to comprehend the empty spaces between nuclei and electrons in what we usually regard as dense matter.

It is disturbing that so far only two lines of Ca II and two of Na I have been discovered in the interstellar gas. The reason is probably that only ultimate lines of any given state of ionization are likely to be absorbed; but attention should be given to the infra-red doublet of Ca II, the lower stage of which is metastable. Ambarzumian has just published a note in which he shows theoretically that the discovery of these lines is not likely. Ultimate lines of other abundant elements are not conveniently placed in the spectrum for observation.

The most important recent advance in the study of interstellar calcium is the investigation of galactic rotation of the interstellar medium published last year by Plaskett and Pearce. Oort, and also Gerasimovič and Struve have shown some time ago that the so-called residual velocities from the interstellar calcium lines are consistent with the hypothesis that the medium rotates around the center of the galaxy discovered by Shapley, under the law of attraction which also causes the stars to revolve around the same center. The differential velocity caused by this gravitational motion is directly proportional to the distance and Plaskett and Pearce have proved statistically that the effective distance of the calcium column between the star and the observer is one-half of the distance between the star and the observer. This proves that, statistically at least, the density of interstellar calcium is approximately constant in all parts of our Milky Way system up to distances of 3000 - 5000 light years from the sun.

I have some doubt as to whether this constancy may be relied upon in the case of every star. There are indications that condensations of the general cloud are actually present. If such a condensation happens to lie between a comparatively nearby star and the sun, the interstellar calcium line will be intense but the galactic rotation effect will be small. I have applied this test to a number of well-known stars, but final results are not yet available.

In 1926 I noticed the rather surprising fact that some of the stars having unusually strong interstellar calcium lines are at the same time unusually red in color. This result was later confirmed by Greaves, Davidson, and Martin at Greenwich and by Gerasimovič at Harvard. However, my own results and also those of Gerasimovič seemed to indicate that while the correlation was present, there was no one-to-one relationship between color and intensity. Confirmatory evidence was

also found by Bok in his study of the η Carinae region. Additional measures of the colors of stars have been made by Elvey at Yerkes, Stebbins and Huffer at Madison, and Becker at Berlin. A summary of the color-intensity correlation has just been prepared by Miss Westgate at Yerkes and a similar discussion by J. Dufay based upon my calcium intensities and upon Becker's colors appeared in one of the latest issues of the *Comptes Rendus*. My conclusion, which agrees with that of Elvey, of Becker and of Miss Westgate, is that both the calcium intensity and the redness of the star are related to the distance, but that the calcium medium is not identical with the medium producing reddening and that consequently the correlation between calcium intensity and color-excess is weak. Dufay, however, is of the opinion that there is at present not enough evidence to doubt the identity of the two media.

III.

In 1930 Trumpler found unrelated evidence in favor of selective reddening of the stars in space. His results have led to a considerable amount of controversy in the astronomical literature of 1931-32, but the prevailing opinion now seems to be that the reddening is actually produced by dust in space. Trumpler concluded that this dust causes a general absorption of starlight amounting to 0.7 mag. per 3000 light years and a selective absorption amounting to 0.3 mag. per 3000 light years and producing a marked reddening of the more distant stars. Elvey, Stebbins, Huffer, Van de Kamp, Miss Williams and others have found a large amount of supporting observational evidence. Schönberg and Gleissberg have worked out the theory of the problem of Rayleigh scattering as applied to interstellar dust. On the other hand the Harvard group, notably Gerasimovič and Miss Payne, have found evidence which they regard as being against the hypothesis of Rayleigh scattering, and Gerasimovič has advanced the hypothesis of super-excitation of stellar atmospheres which leads essentially to a departure from the black body energy curve for the star. Öpik has tried to reconcile the observations with the theory of scattering, and his results are of great importance.

I think it will be generally agreed upon that the more distant B stars are actually redder than the nearer ones and there can be no doubt that the hypothesis of Rayleigh scattering would provide the most attractive explanation. We shall, therefore, test it first.

Consider two stars at distances D_1 and D_2. The observed intensity of the light in any given wave-length of the stars will be

$$I_1\ e^{-\beta D_1} \qquad \text{and} \qquad I_2\ e^{-\beta D_2}$$

β is the constant of Rayleigh and has the form

$$\beta = \frac{32}{3}\ \frac{\pi^3\,(m-1)^2}{N\,\lambda^4}$$

If the intensities are measured in two wave-lengths for both stars, we determine the color excess of one star over the other. If the tempera-

tures of the two stars are the same, this leads to an equation for

$$\beta \quad \text{or} \quad N/(m-1)^2$$

m is the refractive index of the medium, N the number of particles per cubic centimeter. Assuming certain terrestrial values for m, Gleissberg derived $N = 10^4$ for air molecules and $N = 5 \times 10^{-3}$ for solid particles. The first value of N is not consistent with our observations of interstellar calcium, in fact it is about 10^6 too large. The second value cannot be tested by observations of the interstellar lines because solid particles do not give rise to absorption lines.

There is, however, another method of testing Gleissberg's result. The amount of radiation by which the beam of star light is depleted is scattered into space and must reappear as general illumination of the night sky. The scattered radiation may look insignificant, but a simple example will show that this is not the case. Suppose a cubic meter of air at atmospheric pressure is illuminated by the sun, corresponding to 100,000 meter-candles or to a stellar mag. of —26. If we observe our cubic meter at right angles to the beam of light, we shall see it as a light source of 0.06 of a candle, corresponding about to stellar mag. —11, which is similar to that of the full moon.

In the case of interstellar space every cubic centimeter of Gleissberg's medium receives star light amounting to 2000 stars of mag. 1, or to one star of mag. —7. Assuming that the galactic system extends to a distance of 30,000 light years, we can easily integrate with the help of formulae by Fabry the amounts scattered by individual unit-volumes. The result is that every square degree is more than three times brighter than is actually observed. Since Slipher's observations have shown that a large portion of the illumination of the night sky is caused by emission lines, it is clear that the computed value is greatly in excess of the true brightness and the only possibility to reconcile the results would be to diminish the density of Gleissberg's dust by a factor of at least 10.

I am not at all certain that such a reduction would be consistent with the observed amount of reddening. One cannot very well make the medium ten times thinner and expect to get the same color-excesses; however, the computation neglects absorption of the scattered radiation, and is therefore not final. An interesting test would be to determine spectroscopically the energy-distribution of the continuous spectrum of the night sky. To my knowledge this has never been attempted and I hope that we shall be able to undertake this work at the new McDonald Observatory in the Davis Mountains of Texas where conditions are ideal for this type of work. A spectrograph is now being constructed in our shops for this purpose.

We have made, however, a test of Rayleigh scattering in the case of the nebula in the Pleiades. Spectrograms obtained by Keenan and by me were run through the microphotometer, together with spectrograms of some of the bright stars of the Pleiades. In the case of Rayleigh scattering the color-excess measured at wave-lengths 5000 and 3900

should be —1.1 mag. The observed result is —0.3 mag. In order to test this measurement Elvey obtained the color of the nebula with the photoelectric photometer and got —0.2 mag. It is therefore certain that the nebula is not nearly as blue as should be expected on the basis of Rayleigh scattering, but it seems fairly certain that it is slightly bluer than the stars. This may mean that the nebula is composed of larger particles but that there are enough small particles to produce a slight amount of blueness. Or it may mean that the light of the nebula is not scattered starlight but that, as ten Bruggencate suggests, it is caused by the reemission of a continuous hydrogen spectrum excited by starlight.

My somewhat discouraging computations of the brightness of the night sky and our failure to find Rayleigh scattering in a nebula has prompted Keenan, Hynek, and myself to undertake a new investigation of the reddening of stars. Plates have been obtained with the UV objective prism at Yerkes for two of the most strikingly red B stars, namely 55 Cygni and 13 Cephei. Comparison stars of classes B, A, and F were used. We have measured the difference in intensity between the comparison stars and the red B stars at different wave-lengths and have plotted the differences, expressed in stellar magnitudes, against the frequency. It can be shown that if the normal star radiates as a black body the resulting curve should be approximately a straight line, if the differences are due to temperature only. If Rayleigh scattering is present the curve is modified by a factor depending upon λ^4.

In harmony with observations by Trumpler, Kienle, Gerasimovič, etc., our results give practically straight lines for comparison stars of classes B and F. For comparison stars of class A the curve shows a hump at wave-lengths shorter than λ 4000, which is evidently identical with the phenomenon of "ultra-violet appendages" discovered by Gerasimovič. In agreement with Öpik we attribute this to continuous hydrogen absorption in the comparison stars.

The fact that a straight line is obtained indicates that whatever the cause of the reddening may be, it transforms the energy curve of a red B star into one agreeing with Planck's law, but corresponding to a relatively low temperature.* Thus the energy curves of 55 Cygni and of 13 Cephei are, within the errors of measurement, identical with the energy curves of ordinary F-type stars. Rayleigh scattering cannot produce this result.

Three explanations suggest themselves:

1) The reddening is caused by Rayleigh scattering, and the straight-line relationship is caused by other, unknown factors. This is evidently a very unsatisfactory solution.

2) The reddening is caused by scattering of a type depending upon λ^{-1}. Schönberg regards this as highly improbable, because it would de-

*There is, however, some doubt whether any stars radiate as black bodies. Jensen at Kiel and Brill at Berlin have shown that there may be appreciable departures from Planck's curve.

mand a rather artificial frequency distribution of the diameters of the particles. Öpik, on the other hand, regards this explanation as fairly satisfactory.

3) The reddening is caused by Rayleigh scattering in the atmospheres of the stars. In this case the reddening should be correlated with absolute magnitude rather than with distance.

4) The low temperatures are real.

The first three hypotheses have been discussed by Öpik, Gerasimovič, Miss Payne, Miss Anger and others. The fourth has usually been dismissed on the ground that in order to obtain the degree of ionization observed in a star like 55 Cygni (Class B2) at a temperature of 7000°, a pressure of about 10^{-13} atmospheres is required. At so low a pressure a normal reversing layer having a thickness of say 10^2 km cannot contain enough atoms of any given element to produce noticeable absorption lines. Miss Payne estimates, for example, that the ratio of fractional concentrations for stars at 15000° and at 7000° is 10^7.

This argument is perfectly sound so long as we consider reversing layers of uniform thickness. But in fairness to the last hypothesis we must mention that only last year Guthnick at Berlin-Babelsberg completely upset our ordinary conception of a reversing layer. In the star ζ Aurigae he found a reversing layer of more than one astronomical unit in thickness, and Frost, Struve, and Elvey have found a similar reversing layer in the case of ϵ Aurigae. Does this not in part remove our objection to the fourth hypothesis? If a giant star can have a reversing layer of 3×10^8 km in thickness, the average density will be 3×10^6 times smaller than that of the reversing layer of a dwarf, the thickness of which is 10^2 km. This is not so different from the ratio found by Miss Payne for the fractional concentrations.

If hypothesis four were correct, the reddening would be correlated with absolute magnitude. Many former investigations have shown how difficult it is to separate statistically an effect due to distance from one caused by absolute magnitude. A luminous star is seen at greater distances than an intrinsically faint star, and consequently any property correlated with absolute magnitude will also show a correlation with distance. Several astronomers have attempted to find whether absolute magnitude or distance is responsible for the effect of reddening, but the evidence is highly contradictory. Elvey believes that both effects are present. Miss Anger has attempted to solve the question by investigating the colors of stars in open clusters. But in most of these studies the uncertainty in the spectral types of faint stars is a discouraging factor.

There is a great deal of independent evidence that there is an absorbing layer of matter in and near the galactic plane. Hubble has found a well-defined region of avoidance of extra-galactic nebulae, which follows roughly the outlines of the Milky Way. Stebbins and Huffer have recently shown that the red B stars are concentrated in this region of

avoidance. Seares and Elvey have both found indications that space-reddening is related to the regions of obscuration in the Milky Way. Van de Kamp has found from statistical considerations that the existence of a relatively thin absorbing layer is probable. Vyssotsky and Miss Williams, and also Stebbins have found supporting evidence from the colors of globular clusters.

On the other hand, there is the surprising weakness of correlation between color-excess and intensity of interstellar calcium lines, a result which has recently been confirmed by Stebbins and Huffer.

I have divided some of the best-observed B stars into two groups, the giants and the dwarfs. The average color of the giants is distinctly redder than that corresponding to their respective spectral classes, while the dwarfs are distinctly blue. This is the well-known effect mentioned above, which, statistically, can be interpreted either as a distance effect or as an effect of absolute magnitude. The question is—which correlation is more exact. I am unable to answer this now, but there are at least two famous giants which are distinctly blue in color; these are α Cygni and β Orionis.

I think it is fair to conclude that the study of interstellar matter is in a critical stage. Not one of the explanations suggested above is fully satisfactory, and while the tendency among astronomers now is to favor the hypothesis of a medium of interstellar dust, which is not coexistent with the cloud of interstellar gas giving rise to "stationary" absorption lines, we must admit that much work remains to be done, both observationally and theoretically, before we shall be able to definitely accept this interesting hypothesis.

The Purpose and Aims of the Society for Research on Meteorites*

By FREDERICK C. LEONARD

It is fitting indeed that the organization meeting—the practical inception—of the Society for Research on Meteorites should occur in the Field Museum of Natural History, the home of the most representative collection of meteorites in the world. We are fortunate in being able to convene here; and on behalf of all the members present, I wish to thank Director Simms and Dr. Farrington for the privileges and the courtesies which they have so graciously extended to us.

The history of the Society for Research on Meteorites dates back to an informal meeting which took place in my office in the Department of Astronomy of the University of California at Los Angeles, in August,

*The opening address delivered before the organization meeting of the Society for Research on Meteorites, held at the Field Museum of Natural History, in Chicago, Illinois, on 1933 August 21.

1932, just a little over a year ago. It was there that I discussed, for the first time, with Professor H. H. Nininger, the advisability of forming this Society. Professor Nininger agreed that such a Society would be a good thing, and he pledged his active support and wholehearted coöperation to bring it about. So started the preliminary organization which has culminated in this meeting today.

One of the first matters which we had to settle concerned a medium of publication for the proposed Society. POPULAR ASTRONOMY, published by the Goodsell Observatory of Carleton College, Northfield, Minnesota, which formerly has served the American Astronomical Society, and now is serving the American Association of Variable Star Observers and the American Meteor Society, seemed the most suitable journal in the country for our requirements; and, as a result of happy negotiations with the Editors, that periodical became the official organ of this Society. I desire to take occasion here to express our appreciation of the satisfactory arrangements which we were able to conclude with Dr. Gingrich and Dr. Fath, the Editors of POPULAR ASTRONOMY.

The purpose of this Society is to promote the discovery, collection, investigation, and preservation of meteorites, and to advance the science of meteoritics, and related sciences, through the increase and dissemination of knowledge concerning meteorites. We plan that this Society, in its membership and activities, shall be an international organization, and to that end we hope that every investigator and collector of meteorites in the world—in brief, every person who has any serious interest in these remarkable bodies, from whatever point of view—will become a member of this Society and aid in furthering its objects. A cordial invitation is again extended to everyone concerned, in every land, to join with us.

As far as my information extends, there is not, nor has there ever been, another organization of this kind anywhere, and so, in this respect, our Society is unique. Our closest ally in the United States is, of course, the American Meteor Society. Regarding our connections with that Society, I want to say a few words. Obviously, all meteorites have been meteors, in the generally accepted sense of the latter term. The Society for Research on Meteorites will, however, in no way duplicate the work, or run counter to the objects, of the American Meteor Society, but it will supplement, in the special field of meteoritics, the activities of the older organization. The two associations should accordingly coöperate to the fullest extent and be of the greatest mutual benefit.

Concerning the subject of other scientific organizations and the possible relations of this Society to them, it may not be amiss to voice the hope that in the near future our Society may become affiliated with the American Association for the Advancement of Science and hold many of its meetings in conjunction with meetings of the American Association. Moreover, after the activities of this Society are well under way, and it has demonstrated its usefulness in the field of meteoritic research,

we trust that, especially in view of its worldwide character, it may receive proper recognition from the International Astronomical Union.

The current interest in meteorites, and the importance of their detailed study, are well attested by several quotations which I shall incorporate into this address. The first is from Professor Nininger's open letter to myself, dated February 24, 1933, in which he writes:

"Your letter of February 20, proposing the organization of a Society for Research on Meteorites, meets with my hearty approval. During the past ten years I have been again and again impressed with the possibilities for significant research in this little-explored field, and I believe that an association of those who are interested in the subject will tend, in a very important way, to coördinate the efforts which are being put forth along this line as well as to initiate new lines of investigation.

"There is little doubt in my mind that some of the most significant discoveries of the next few decades will lie in the field of meteoritics. The men of the past two generations have laid a good foundation, and now with modern facilities it should be possible to go forward with the erection of a super-structure that shall give meteoritics a definite and creditable standing among the sciences."

The second quotation, from his circular letter of March 20, 1933, addressed to fellow scientists who may be interested in the formation of this Society, is hardly less significant than the first. He says:

"For ten years I have been giving much of my time to this science, and I confess that the ignorance among scientific men, regarding any but the most elementary facts concerning meteorites, is truly appalling. An adequate study of the subject offers, in my opinion, to be most fruitful. I am persuaded that the significance of meteorites in the economy of nature is hardly beginning to be appreciated.

"There is probably nothing that could better promulgate the study of meteoritics than a Society of the kind suggested."

The third and last excerpt is from "Notes on the Progress of Astronomy in the Year 1932-33," by Director Robert G. Aitken of the Lick Observatory of the University of California, an address delivered at the Salt Lake City Meeting of the Pacific Division of the American Association for the Advancement of Science (Session for Research Announcements, June 12, 1933). This address has since appeared in the June, 1933, number of the *Publications of the Astronomical Society of the Pacific*. Dr. Aitken reports:

"Dr. L. J. Spencer, Keeper of Mineralogy at the British Museum, gave an address before the Royal Geographical Society on January 16, 1933, on 'Meteoritic Craters as Topographical Features on the Earth's Surface.' He described a number of crater-like formations discovered in recent years in different parts of the world where there was no indication of volcanic action and showed that there is direct evidence in

favor of the theory of the meteoritic origin not only of the well-known Meteor Crater in Arizona, but also of the group of craters found near Henbury, Australia, in 1931, and of the craters found at Wabar, in the Arabian desert, in 1932. He regards the direct evidence of such origin less convincing in the case of the great Siberian craters, though the general opinion of experts is that they did result from the fall of a gigantic meteoric body in 1908. The evidence in other cases, among them the formations found in certain regions of Estonia and Africa, has little weight, in his opinion. Less authoritative accounts of crater-like formations in our Southern States, and elsewhere, have been published in recent months, but no pronouncement on the subject of their probable origin can be made until the regions have been thoroughly investigated.

"Professor Lipman's announcement that he had recovered bacteria from certain specimens of meteorites under conditions that apparently precluded the possibility of their terrestrial origin aroused widespread interest and brought forth comment both friendly and critical. Professor Lipman advanced his conclusions with true scientific caution, but evidently thinks they are correct. Whatever the final verdict may be—and to many this seems to be another case to which the famous dictum of Pasteur applies, that in scientific matters it is always a mistake not to doubt until one is forced to believe—the result has been to stimulate interest in meteoric research. The American Meteor Society, . . . has been very active for several years, and its membership and enthusiasm are increasing. Now, the Society for Research on Meteorites has been organized, . . . Since meteorites are the only extra-terrestrial bodies we can actually handle and examine in detail and since meteoritic falls, as appears from the recent discoveries noted above, may possibly have had a more important part in the formation of the earth's crust than we are accustomed to believe, any movement for their more scientific investigation is to be encouraged."

These are but a few of many recent statements which might be adduced to evidence the need for meteoritic research. Everything indicates that the time is ripe for the establishment of a Society which shall undertake the systematic and continuous investigation of meteorites and their bearing on both terrestrial and cosmic phenomena.

The response which we have received to date from all parts of the United States, in answer to the call for members, has been most encouraging, and shows how considerable must be the number of persons in this country alone, who are really interested in meteorites. We trust that we have yet to hear from many more, in distant lands, as well as in our own. The thirty-seven charter members of the Society, whose names have appeared in the June-July, and August-September, 1933, issues of Popular Astronomy, constitute a widely dispersed and representative group of people, mostly professional scientists, in the several fields of astronomy, physics, chemistry, geology, mineralogy, biology, and meteoritics. These persons, together with all who have joined with us since

those first two lists were published,* and especially the members present at this meeting, would seem to insure the permanency and the success of the organization which we are initiating.

DEPARTMENT OF ASTRONOMY, UNIVERSITY OF CALIFORNIA
AT LOS ANGELES, 1933 AUGUST.

*Bringing the total number of charter members to approximately fifty-five.

The Recent Marking on Saturn

By LATIMER J. WILSON

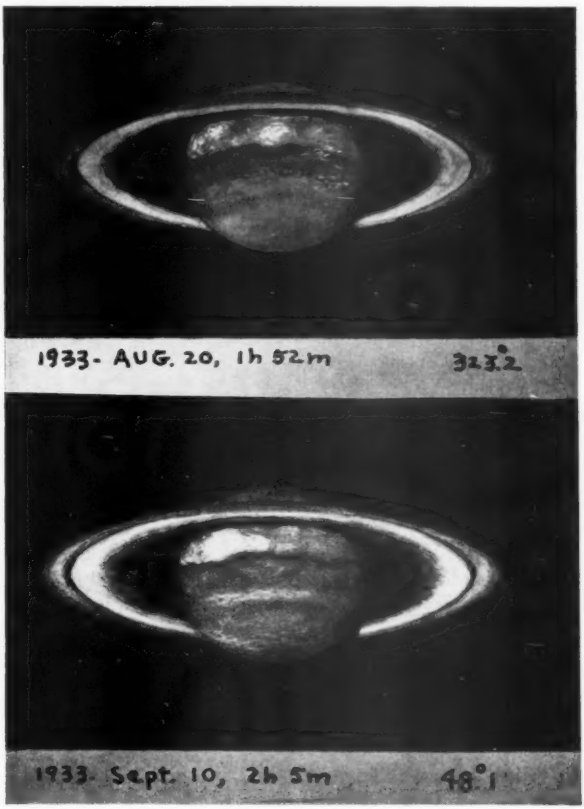
The disk of Saturn, normally banded with faint belts somewhat like Jupiter, and containing few distinct details that would furnish more precise data for determining the rotation period of various latitudes, since the early part of August, 1933, has exhibited certain markings from which a rotation period can be found. Not since the white spot in the equatorial zone in 1876, has there been a marking so conspicuous on Saturn. The spot of 1876 enabled Hall to determine a rotation period of 10 hours 14.4 minutes, a value which seems generally confirmed for the rotation of the equatorial currents. E. E. Barnard, in 1903, found some spots in 36 degrees north latitude which gave a rotation for that region 10 hours 38 minutes.

The present disturbance on Saturn seems centered in the equatorial zone and the north equatorial belt, and was discovered according to reports independently by Dr. Weber in Germany, Will Hay, in England, and John E. Willis, U. S. Naval Observatory astronomer. The date was August 5, 1933. On that night the present writer saw Saturn through an 11-inch reflector, magnification 220, at ten o'clock, Central Standard Time, ($4^h\ 0^m$, G.C.T.). The region of the disk two hours ahead of the disturbance was then in view. Unusual whiteness of the equatorial zone, and remarkable redness of the north equatorial belt were noted. Also the inner edge of Ring C was apparently unusually distinct, in fact it was better seen than the writer ever saw it. These notes were made in the record book at the time when the writer was unaware of the white spot which had just appeared.

Since then, weather permitting, a continuous observation through most of August and September to September 12 has been conducted. Sixty drawings have been made and plotted. The rapid extension of the disturbed area has made it extremely difficult to identify the individual white spots associated with it. The main area involved seems to be bordered on its following extremity with a curved margin similar in aspect to that of the Red Spot Bay on Jupiter, or the preceding white loop of the great south tropical disturbance on Jupiter. This marking on Saturn seems to furnish the most distinct object to time in transit of the central meridian.

The apparition of the principal area of disturbance, intensely brilliant white, was nearly central on the planet on August 20, $2^h\ 55^m$, G.C.T.

This was taken for a hypothetical zero degrees and the rotation period, $10^h\ 14^m.4$, was used as a base for finding the motion, or actual rotation



of this marking. Calculations show that zero degrees (System I) were on the meridian as follows:

1933	G.C.T.	h	m	1933	G.C.T.	h	m	1933	G.C.T.	h	m
Aug.	5	4	31.45	Aug.	18	9	58.24	Sept.	1	1	39.08
	6	1	0.27		20	2	55.00		2	8	22.40
	7	7	43.50		21	9	38.26		3	4	51.28
	8	4	12.32		22	6	7.10		4	1	20.16
	9	0	41.14		23	2	35.94		5	8	3.54
	10	7	24.37		24	9	19.20		6	4	32.46
	11	3	53.19		25	5	48.04		7	1	1.38
	12	0	22.01		26	2	16.92		8	7	44.76
	13	7	5.24		27	9	0.24		9	4	13.68
	14	3	34.06		28	5	29.12		10	0	42.60
	15	0	2.88		29	1	58.00		11	7	25.98
	16	6	46.14		30	8	41.32		12	3	54.90
	17	3	14.98		31	5	10.20				

Employing the rotation period, $10^h\ 14^m.4$, corrected for intervals between passage in the manner that corrections are made for Jupiter, the central meridian of each drawing was calculated. From these, a plot was made showing the most distinct markings. Identification was strongly suggested in the markings bordering the north equatorial belt, and the line drawn through the mean of these indicates a rotation period slightly slower than the accepted figure. The best defined marking was that of the following end of the principal area of disturbance. It has a rotation period of $10^h\ 15^m$.

Further work is necessary to determine the periods of currents northward of this latitude. White spots in Jupiter's equatorial zone show a rotation current more rapid than elsewhere, and often more rapid than the mean current in which they are found. It appears that this is not true of Saturn. Subsequent observations may add to our information concerning the rotation of this planet.

The change in longitude of the following end of the principal white area is indicated as follows:

1933 August 23,	$3^h\ 45^m$	40.3
September 1,	$2^h\ 47^m$	39.8
September 10,	$2^h\ 5^m$	48.1

Uncertainty in locating it on the central meridian involves an error not allowed for in the results. The mean of observations furnishes more reliable data than individual observations. There may be actual irregularity of motion in the marking similar to the irregularity shown in markings on Jupiter at times. The small change between August 23 and September 1 is of the order of errors in observation and indicates a rotation in that interval, $10^h\ 14^m.4$. From September 1 to September 10, an interval of ten days, longitude increased 8.3 degrees. This gives a rotation in that interval of $10^h\ 15^m.0$.

Box 63, Franklin, Kentucky, September, 11, 1933.

Planet Notes for November, 1933

By CLIFFORD E. SMITH

The *Sun* will be moving southeast from the western part of Libra to the northern part of Scorpio. The distance of the earth from the sun will be about 92.2 million miles at the beginning of the month, and this distance will decrease to about 91.6 million miles by the end of the month. The position of the sun on the first and last days of the month will be, respectively:

R.A. $14^h\ 23^m$, Decl. $-14°\ 13'$; R.A. $16^h\ 22^m$, Decl. $-21°\ 33'$.

The phenomena of the *Moon* will occur as follows:

Full Moon	Nov.	2 at	2 A.M.	C.S.T.
Last Quarter		10 "	6 A.M.	"
New Moon		17 "	10 A.M.	"
First Quarter		24 "	2 A.M.	"
Apogee		6 "	6 P.M.	"
Perigee		18 "	7 P.M.	"

Mercury will be in Libra. At the beginning of the month it will be an evening object setting about an hour after the sun, but, by the end of the month it will be a morning object rising about an hour and a half before the sun. Inferior conjunction will occur on November 18 at 6:00 P.M., C.S.T. At the beginning and at the end of the month the distance of the earth from Mercury will be about 80 million miles, and, during the middle of the month, this distance will be about 20 million miles less. The apparent diameter of Mercury during the first and last parts of the month will be about 7 seconds of arc. Conjunction with the moon will occur on November 17 at 5:00 P.M., C.S.T. (Mercury 5°.2 N.).

Venus will be an evening object of great brilliance (about mag. —4), setting about three hours after the sun. Its apparent motion will be easterly from the southern part of Ophiuchus to the eastern part of Sagittarius. Its distance from the earth will decrease from about 80 to about 60 million miles and its apparent diameter will increase from about 20 to about 26 seconds of arc. On November 20 there will be an occultation of Venus by the moon.[1] At conjunction Venus will be about 2 minutes of arc south of the position of the center of the moon as seen from the center of the earth. Greatest elongation east will occur on November 25 at 9:00 A.M., C.S.T. (47°.3).

Mars will be an early evening object setting about two hours after the sun. It is approaching conjunction so that it is not in a favorable position for observation (distance from earth about 200 million miles and apparent diameter about 4½ seconds of arc). Its apparent motion will be easterly from the southern part of Ophiuchus to the western part of Sagittarius. Conjunction with the moon will occur on November 19 at 7:00 P.M., C.S.T. (Mars 2°.9 N.).

Jupiter will be a morning object in central Virgo. During the middle of the month it will rise about three hours before the sun, and its distance from the earth will be about 580 million miles (apparent diameter about 30 seconds of arc). Its apparent motion in the sky will be easterly. Conjunction with the moon will occur on November 14 at 6:00 P.M., C.S.T. (Jupiter 5°.5 N.).

Saturn will be an evening object in central Capricornus, and, at the beginning of the month, it will be near the meridian at sunset since quadrature east will occur on November 2 at 4:00 P.M., C.S.T. Its distance from the earth during this period will be about 930 million miles and its apparent diameter (planet only) will be about 15 seconds of arc. There will be an occultation of Saturn on November 22.[2] Conjunction with the moon will occur at 2:00 P.M., C.S.T., and at that time the center of Saturn will appear about 7 minutes of arc north of the center of the moon as seen from the center of the earth.

Uranus will be in eastern Pisces, and, since it was at opposition in October it will be above the horizon most of the night hours for northern observers. Its distance from the earth will be about 1800 million miles, and its apparent diameter will be about 3½ seconds of arc. Conjunction with the moon will occur on November 1 at 2:00 A.M., and on November 28 at 6:00 A.M., C.S.T. (Uranus 5°.4 S. in each case).

Neptune will continue in central Leo. During the middle of the month it will rise soon after midnight. Its distance from the earth will be about 2800 million miles, and its aparent diameter will be about 2½ seconds of arc. Conjunction with the moon will occur on November 12 at 7:00 A.M., C.S.T. (Neptune 2°.7 N.).

[1] POP. ASTRON., p. 33, Jan. 1933. [2] POP. ASTRON., p. 36, Jan. 1933.

Comet Notes

By G. VAN BIESBROECK

For many months there have not been any comets visible in small instruments. Several faint objects have, however, been under observation.

Comet Carrasco (1933 *d*), briefly mentioned in the August issue, has remained unconfirmed. Mr. Carrasco has already discovered a comet at Madrid, Spain, in April, 1932. The discovery was made on plates taken in the regular work on asteroids carried out in that observatory. On similar plates taken on July 15 this summer Mr. Carrasco noticed what seemed to be a cometary image; a double exposure left no doubt in his mind as to the reality of the object. The magnitude was given as 10, which should have made it an easy object for other observers. However, neither the discoverer nor anybody else found evidence of its existence on the following nights so that it is almost certain now that the images on the plate were spurious.

Periodic Comet Wolf I (1933 *c*). A telegram dated July 26 from the Lick Observatory at Mt. Hamilton, California, brought the news of the early recovery of Periodic Comet Wolf I. From the available calculations this object was not expected until this fall but Prof. M. Kamienski of Warsaw, Poland, made a careful computation of the perturbations of this object since its last apparition in 1925, and this enabled Dr. H. M. Jeffers to find it on long exposures taken with the Crossley reflector. The discovery position was:

1933 July 25.2694 $\alpha = 20^h\,7^m\,57^s.2$ $\delta = +20^\circ\,40'\,6''$

This extremely faint object was confirmed by different exposures on July 25 and July 29. The predicted position was only very slightly in error: the difference can be accounted for by shifting the time of perihelion passage to 0.1 of a day earlier than Kamienski's expected value, 1934 Feb. 27.864 U.T. The comet was recovered near opposition. Since then it has slowly moved westward. Although it approaches the sun until next February its light will remain nearly unchanged because the distance from the earth is now increasing. The ephemeris is not given here since this object will remain one of the faintest comets ever observed.

Max Wolf at Heidelberg was the first discoverer of this object in 1884, when it came fairly close to the earth and appeared as bright as magnitude 8. Its orbit indicated a period of revolution of about 7 years and it was seen again at all the following returns except in 1905. Considerable perturbations modified the orbit when the comet passed within nine million miles of Jupiter in 1922. Since then the period has lengthened to 8 years and the conditions of visibility have become much less favorable aside from the fact that the intrinsic light of the comet seems to have diminished appreciably since the first discovery.

Of the comets that were seen earlier in the year two are yet under observation on this side of the equator but they are both very faint.

Comet 1932 *g* (Geddes) is now approaching conjunction with the sun (Oct. 10) after which date it will become somewhat better placed in the morning sky. It was photographically recorded by the writer on September 17 and 21 as a small round coma of 14½ magnitude, quite close to Crommelin's ephemeris given on p. 404. Very likely further observation will be possible for some time to come since the brightness is not expected to change much. This comet has now been followed for 15 months since the discovery by Mr. Geddes on 1932 June 22. The object

was reported first through the Melbourne Observatory which led to the erroneous assumption that it was discovered there (p. 324). Mr. Geddes is a resident of Otekura, New Zealand, and he communicated his discovery through Dr. Adams at Wellington, New Zealand, to the Melbourne Observatory. I am indebted to J. M. Baldwin, Director of the latter institution for this correction.

COMET 1933 *c* (PERIODIC GIACOBINI-ZINNER) was last photographed on September 18 and 21 by the writer and has now become a very difficult object. On these days there was still a trace of the tail although the brightness had dropped to magnitude 15.

COMET 1933 *l* (PONS-WINNECKE) has been well observed in the southern hemisphere during the summer months and may still be followed there. But its declination is too far south for our latitudes.

The region where PERIODIC COMET FINLAY is expected has been searched several times by the writer, but no trace of this object could be found. Other observers have not been more successful. The comet must be quite faint and its position is none too certain, which makes the recovery very difficult. It seems as if this object is going to pass by unobserved this year.

Williams Bay, Wisconsin, September 22, 1933.

Variable Stars

Monthly Report of the American Association of Variable Star Observers for July and August, 1933

The sensation of the past month among variable star observers was the announcement by L. C. Peltier of the sudden increase in brightness of Nova Ophiuchi, otherwise known as RS Ophiuchi. Mr. Peltier has been observing this so-called nova variable for a dozen years, always finding it about the eleventh magnitude, and on August 15 he was rewarded by finding it bright, magnitude 6.4. His prompt notification to Harvard and Yerkes furnished the possibility of spectrum plates being secured. Heartiest congratulations to Mr. Peltier. To be sure, E. Loreta of Bologne, Italy, had found the star rising and at maximum, 4.3, a few days earlier but word reached the professional astronomer too late to allow spectrum plates to be taken at those critical times. A few observations of RS Oph appear herewith and others will be included in the next Report. Blueprint charts were promptly issued to regular A.A.V.S.O. observers and numerous observations have been obtained. At this date, September 12, the nova has decreased to magnitude 9.4; to one hundredth of its maximum brilliance.

The names of many new observers appear in this voluminous report. Among them, L. Armfield of West Allis, Wisconsin; B. F. Grandstaff of Dallas, Texas; A. F. Boyd of Wauwatosa, Wisconsin; Leon Cap of Sao Paulo, Brazil; H. L. Grunwald of Milwaukee, Wisconsin; A. P. Hess, Jr., of Mullica Hill, New Jersey; Miss Olive Hunt of Stamford, Connecticut; R. S. Perkin of Garden City, New York; M. Ruben of Duluth, Minnesota; F. H. Reynolds of Potsdam, New York.

Messrs. Skaggs of Oakland, California, Olcott of Norwich, Connecticut, and Pickering of East Orange, New Jersey, have returned to the ranks of active observing.

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1933.

June 0 = J.D. 2427224; July 0 = J.D. 2427254; Aug. 0 = J.D. 2427285.

J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.	J.D.	Est.	Obs.
S Scl.			T Cas			S Tuc			V And			U Tuc			U Psc		
001032			001755			*001862*			004435			*005475*			011712		
241	12.3	Ht	266	8.1	Pi	241	9.5	Ht	272	9.8	L	210	9.6	Bl	261	11.7	L
252	12.2	Ht	266	7.5	O	252	9.6	Ht	283	9.4	Br	220	9.2	Ht	272	11.4	L
X And			267	8.1	Mn	254	9.4	Bl	285	9.4	L	227	9.1	Sl	278	11.2	El
001046			271	7.6	Jo	263	9.7	Bl	299	9.4	O	228	9.3	Bl	284	10.2	Br
234	10.0	Jo	272	7.8	L	280	11.1	En	RR And			237	9.6	Bl	284	11.1	L
237	10.4	Jo	272	7.9	Ah	S Cet			004533			241	9.6	Ht	284	11.1	Pt
240	10.8	Jo	274	8.3	Mn	*001909*			278	12.1	El	245	9.4	Sl	RZ Per		
246	11.0	Jo	274	8.8	Mc	249	7.9	L	283	11.4	Br	252	10.0	Ht	012350		
268	11.5	Jo	277	7.6	Jo	254	8.0	Pt	289	11.2	O	254	10.0	Sl	145	12.5	El
270	11.8	Fd	277	8.4	Ah	260	7.8	L	299	10.7	O	254	10.3	Bl	246	13.5	L
277	12.3	Jo	279	8.0	We	261	8.0	Ko	RV Cas			262	11.0	Bl	254	13.5	L
280	11.8	Br	280	8.4	Ah	273	8.0	L	004746a			272	11.6	En	270	11.9	L
T Cet			281	8.5	Mn	274	8.0	Ko	254[	13.2	Pt	280	11.9	En	280	11.1	El
001620			281	8.1	Hf	278	8.5	El	283[	14.8	Br	282	12.5	Ht	283	10.8	Br
269	6.3	L	281	7.7	Jo	281	8.4	L	— Cas			Z Cet			R Psc		
284	6.7	L	282	8.3	Ka	282	8.1	Pt	004746b			*010102*			012502		
T And			282	7.9	Lt	283	8.9	Hf	254	10.6	Pt	249	9.1	L	254	12.0	Pt
001726			283	8.3	Wd	T Phe			282	10.5	Pt	254	9.6	Pt	284	8.0	Pt
234	8.3	Jo	285	7.9	L	*002546*			W Cas			258	9.4	L	RU And		
240	8.5	Jo	289	8.4	O	241	8.8	Ht	004958			270	10.4	L	013238		
241	8.6	Hf	291	8.6	Wd	252	9.7	Ht	234	9.0	Jo	278	10.5	El	245	11.4	Cy
246	8.9	Jo	291	8.3	Sh	Y Cep			236	9.5	He	284	10.9	L	249	11.5	L
254	9.1	Pt	292	8.6	Hf	003179			236	9.4	Ah	284	10.9	Pt	254	11.0	Pt
268	9.5	Jo	295	9.1	Mc	280	13.6	Br	237	9.7	Ko	U And			258	11.3	L
270	10.1	Fd	303	9.0	Mc	U Cas			240	9.4	Jo	010940			270	11.0	Fd
273	9.8	Jo	R And			004047a			241	9.7	Hf	249[	14.3	L	273	11.3	L
278	10.5	El	001838			150	11.2	Me	242	9.8	We	270[	14.3	L	274	11.2	Cy
281	10.7	Jo	237	8.9	Ko	237	9.8	Ko	243	9.5	Fd	278	14.4	El	284	11.0	Br
282	10.1	Pt	238	8.6	Jo	238	9.5	Jo	244	10.0	Ra	283	14.0	Br	284	10.8	Pt
283	10.0	Hf	240	8.7	Jo	240	9.5	Jo	246	9.3	Jo	UZ And			Y And		
283	10.9	Br	243	9.5	Fd	241	9.8	Hf	247	9.6	Ko	011041			013338		
290	10.9	Hf	244	9.2	Ah	243	9.7	L	251	9.4	Jo	246	9.8	L	240	11.7	Jo
290	11.0	Wd	247	8.8	Jo	243	10.0	Fd	253	10.1	We	247	9.6	Jo	245	11.4	Cy
T Cas			253	9.5	Ra	247	9.7	Jo	254	9.1	Pt	254	9.4	L	247	12.0	Jo
001755			254	9.2	Pt	251	9.9	Jo	263	10.0	O	258	9.1	L	249	11.5	L
226	7.6	Jo	261	9.9	Ko	251	10.3	L	263	9.9	Jo	269	9.2	L	254	12.8	Pt
234	7.6	Jo	268	10.0	Jo	253	10.3	Ra	266	10.2	Pi	278	10.1	El	258	12.7	L
236	7.5	He	270	10.0	Fd	254	10.7	Pt	266	9.5	So	283	9.6	Br	273	13.8	L
236	7.4	Ah	272	9.8	Ah	259	11.0	L	268	9.9	Jo	285	9.9	L	284	14.2	L
237	7.5	Jo	274	10.5	Ko	261	10.0	Ko	270	9.5	Ra	287	9.5	Jo	284	14.1	Br
237	8.9	Mc	278	10.1	El	272	11.9	L	272	10.1	Ah	S Psc			X Cas		
238	8.7	Mc	280	10.9	Ra	274	10.5	We	273	10.0	Gr	011208			014958		
239	7.7	Hf	282	10.6	Jo	274	11.0	Ko	273	9.7	We	278	14.2	El	152	11.9	Bn
240	7.5	Jo	282	10.5	Pt	280	10.9	Ra	273	9.8	Mg	284	14.3	L	157	11.9	Bn
242	7.8	We	283	10.7	Br	280	12.5	Br	273	10.3	Jo	S Cas			162	12.2	Bn
243	7.4	L	283	10.2	Hf	282	12.6	Pt	277	10.4	Jo	011272			237	12.4	Jo
244	7.5	Ah	283	10.5	Wd	RW And			278	10.6	El	217[	12.6	Me	240	12.3	Jo
245	8.8	Mc	289	10.4	Wd	004132			279	10.3	We	254	12.1	Pt	247	12.0	Jo
246	7.4	Jo	291	10.6	Wd	254	11.2	Pt	281	10.5	Jo	266	10.6	Ko	254	12.3	Pt
248	8.7	Mc	297	11.6	So	282	13.1	Pt	282	9.3	Pt	268	10.1	Jo	268	12.5	Jo
250	7.4	L	S Tuc			283	12.6	Br	289	10.5	Wd	277	9.8	Jo	279	12.6	Bn
253	7.6	We	*001862*			297	12.0	So	289	10.5	O	284	9.3	Pt	284	12.1	Pt
254	7.0	Pt	126[	12.4	En	V And			297	10.6	So	292	9.5	O	286	12.3	Bn
259	7.5	L	199	8.7	Bl	004435			U Tuc			U Psc			U Per		
265	8.7	Mc	210	8.3	Bl	246	11.1	L	*005475*			011712			015254		
265	7.9	Hf	228	8.8	Bl	254	10.6	L	126[	12.9	En	251	11.9	L	145	10.5	El
266	7.7	Jo	237	9.1	Bl	258	10.7	L	199	10.0	Bl	254	11.7	Pt	226	9.3	Ry

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
U PER	T PER	S PER	W PER	Y PER	T CAM
015254	021258	021558	024356	032043	043065
234 8.7 Jo	145 8.7 El	294 9.5 Wd	254 9.9 Ry	274 9.5 Mc	280 9.6 El
238 8.9 Mc	155 8.9 Go	R CET	256 9.3 Pt	277 9.0 Jo	281 9.5 Jo
238 9.2 Ry	159 8.9 Go	*022000*	260 9.4 Ry	280 9.0 El	285 9.5 L
240 8.8 Jo	163 9.0 Go	273 12.9 L	266 9.3 Ry	280 9.2 Ah	286 9.3 Pt
245 8.8 Mc	175 8.9 Go	284 12.0 L	266 9.5 Jo	281 9.3 Hf	RX TAU
245 8.8 Cy	237 8.7 Jo	RR PER	266 9.7 Pi	281 8.7 Jo	043208
246 8.6 Jo	240 8.4 Jo	022150	267 9.9 Mc	284 8.5 Pt	284 11.8 L
248 8.6 Mc	241 9.1 Hf	145 13.0 El	267 9.3 Cy	297 8.9 Mc	R RET
249 9.1 Ry	246 8.8 Jo	256[13.4 Pt	270 9.1 Fd	303 8.5 Mc	*043263*
254 8.8 Ry	256 8.8 Pt	273 14.5 L	273 9.1 Ry	R PER	126 12.5 En
254 8.6 Pt	266 8.5 Jo	280[13.7 El	274 9.8 Ko	032335	196 7.6 Ht
260 8.9 Ry	272 9.0 Ah	284[13.4 Pt	274 9.9 Mc	249 9.9 L	199 7.3 Bl
266 8.9 Ry	280 9.1 El	U CET	275 9.2 We	256 9.3 Pt	208 7.3 Ht
267 8.8 Mc	281 8.7 Jo	*022813*	275 9.4 Cy	258 9.4 L	209 7.3 En
270 8.7 Fd	281 9.1 Hf	284 12.6 L	277 8.9 Jo	270 9.2 Fd	210 7.1 Bl
271 8.7 Cy	284 8.5 Pt	284 12.8 Pt	277 9.1 Ry	272 9.3 L	218 7.4 Ht
272 8.4 Ah	294 9.1 Wd	RR CEP	280 9.3 El	280 9.2 El	224 7.4 Ht
273 8.6 Ry	294 9.2 Hf	022980	281 8.9 Jo	284 9.3 Pt	226 7.4 Sl
274 8.6 Mc	294 9.2 Pe	256[12.5 Pt	284 9.4 We	287 9.0 Jo	227 7.4 Bl
277 8.7 Jo	Z CEP	278[13.7 Br	284 8.8 Pt	NOV PER	236 8.1 Bl
277 8.5 Ah	021281	R TRI	295 9.5 Mc	032443	236 7.6 Ht
277 8.6 Ry	254[12.5 Pt	023133	299 9.0 O	256 13.5 Pt	236 8.0 Sl
280 8.5 El	278[14.2 Br	150 9.5 Me	303 9.4 Mc	284 13.0 Pt	243 7.8 Bl
280 8.3 Ah	284[12.5 Pt	234 9.7 Jo	R HOR	U ERI	245 8.2 Sl
281 8.3 Hf	o CET	240 9.5 Jo	*025050*	*034625*	252 8.4 Sl
284 8.2 Pt	*021403*	246 9.4 Jo	126 12.6 En	125 12.3 En	252 8.7 Bl
284 8.5 Cy	251 6.7 L	256 9.0 Pt	199 10.0 Bl	X PER	258 9.1 Bl
287 8.2 Jo	254 7.6 Pt	270 8.6 Fd	210 9.0 Bl	034930	270 9.9 Bl
295 8.3 Mc	257 7.8 Cy	272 8.4 Ah	227 6.6 Bl	152 6.1 Go	278 9.8 Bl
303 8.1 Mc	259 7.3 L	273 8.7 Ra	227 6.6 Sl	159 6.1 Go	X CAM
S ARI	271 8.3 Cy	275 8.5 We	236 6.5 Bl	163 6.1 Go	042374
015912	273 7.9 L	280 8.3 Ah	254 5.9 Sl	175 6.1 Go	150 9.4 Me
173 14.3 L	277 8.2 Cy	281 8.7 Hf	T HOR	T ERI	160 10.6 Me
284 14.5 L	284 8.0 L	281 8.0 Jo	*025751*	*035124*	227 9.9 L
R ARI	284 8.2 Pt	284 7.8 We	126 11.7 En	125 11.3 En	245 8.4 Cy
021024	S PER	284 8.0 Pt	199 7.8 Bl	R TAU	246 8.1 L
249 10.2 L	021558	T ARI	210 9.0 Bl	042209	254 8.1 L
254 9.8 Pt	145 9.2 El	024217	227 9.5 Sl	284 11.5 Pt	256 8.0 Pt
258 9.6 L	150 9.2 Me	274 8.8 Ko	254 11.6 Sl	W TAU	259 8.0 L
270 8.3 Fd	237 9.0 Jo	284 8.0 We	U ARI	042215	266 8.3 Cy
273 8.3 L	240 8.8 Jo	W PER	030514	269 10.1 L	272 8.0 L
274 8.2 Ah	241 9.4 Hf	024356	249 8.2 L	271 10.7 Cy	277 8.3 Cy
275 8.5 We	245 9.2 Cy	145 10.0 El	259 8.2 L	282 10.7 Cy	280 7.7 El
281 8.6 Hf	246 8.9 Jo	150 10.2 Me	273 8.2 L	284 11.1 L	285 8.1 L
281 8.4 Jo	256 8.9 Pt	226 9.9 Cy	X CET	284 11.0 Pt	286 8.0 Pt
284 8.5 We	266 9.5 Jo	226 10.0 Ry	*031401*	S TAU	R DOR
284 8.1 L	266 9.5 Pi	234 10.0 Jo	281 11.3 L	042309	*043562*
284 8.0 Pt	266 9.3 O	237 9.7 Jo	284 11.7 Pt	284 12.8 Pt	126 5.3 En
287 8.2 Jo	268 9.0 Sz	237 9.9 Ko	Y PER	T CAM	196 5.5 Ht
W AND	271 9.4 Cy	238 10.0 Mc	032043	043065	199 5.8 Bl
021143a	272 9.2 Ah	238 10.0 Ry	145 10.0 El	234 11.5 Jo	208 5.4 Ht
254 11.8 Pt	280 9.4 El	240 9.5 Jo	234 9.6 Jo	237 11.0 Jo	209 5.6 En
272 9.1 Ah	281 9.0 Jo	242 9.9 Cy	237 9.7 Ko	246 10.6 L	210 5.6 Bl
281 8.0 Jo	281 9.8 Hf	245 9.9 Mc	240 9.4 Jo	254 10.4 L	218 5.7 Ht
284 7.2 Pt	284 9.5 Cy	246 9.2 Jo	246 9.5 Jo	256 10.1 Pt	224 5.6 Ht
287 7.8 Jo	284 8.8 Pt	248 9.9 Mc	256 8.6 Pt	259 9.9 L	226 5.6 Sl
	294 9.4 Pe	249 9.8 Ry	272 9.4 Ah	272 9.6 L	227 5.7 Bl
	294 9.6 Hf	252 9.9 Cy	274 9.3 Ko	274 9.4 Ko	236 5.5 Bl

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
R DOR	S PIC	RR TAU	V CAM	NOV PIC	Z PUP
043562	*050848*	053326	054974	*063462*	*072820b*
236 5.7 Ht	227 8.5 En	150 12.1 Me	273 12.9 L	235 8.7 En	235[12.6 En
236 5.8 Sl	236 8.7 En	152 11.2 Me	284 13.4 L	236 8.7 Ht	S VOL
243 5.5 Bl	243 8.9 En	153 11.2 Me	286 13.0 Pt	241 8.4 Ht	*073173*
245 5.7 Sl	252 9.2 En	158 10.9 Me	Z AUR	243 8.7 En	126[12.2 En
252 5.8 Sl	262 9.4 Bl	159 10.9 Me	055353	252 8.4 Ht	196 11.1 Ht
252 5.2 Bl	R AUR	160 10.9 Me	150 10.8 Me	S LYN	199 11.0 Bl
258 5.5 Bl	050953	281 11.1 L	238 10.3 Mc	063558	209 10.5 Ht
270 5.5 Bl	153 8.5 Me	284 10.7 L	245 10.1 Mc	145 9.8 El	210 11.5 Bl
278 5.5 Bl	256 12.6 Pt	286 11.2 Pt	248 9.9 Mc	226 12.8 L	220 11.2 Ht
R CAE	286 13.0 Pt	288 11.4 Pt	254 10.6 Pt	273 13.8 L	220 11.0 En
043738	T PIC	RU AUR	256 10.3 Pt	284 14.2 L	227 11.7 Bl
125 10.6 En	*051247*	053337	274 9.7 Mc	287 13.4 Ry	235 11.1 En
210[12.0 Bl	126[11.8 En	280 12.2 El	280 10.2 El	X GEM	236 11.8 Bl
237[11.5 Bl	196 10.6 Ht	286[12.0 Pt	286 10.1 Pt	064030	236 11.2 Ht
R PIC	199 10.0 Bl	U AUR	288 10.2 Pt	145 8.5 Bn	237 11.8 Bl
044349	208 9.9 Ht	053531	299 10.6 Mc	152 8.5 Bn	241 11.4 Ht
125 7.2 En	210 8.5 Bl	270 9.1 L	R OCT	157 8.3 Bn	243 11.1 En
196 7.7 Ht	218 8.9 Ht	284 9.3 L	*055686*	162 8.3 Bn	244 11.7 Bl
199 7.7 Bl	224 8.7 Ht	286 9.5 Pt	210 12.0 Bl	R LYN	248 11.0 En
208 7.5 Ht	227 8.6 Bl	SU TAU	220[12.0 En	065355	252 11.9 Bl
210 7.3 Bl	236 8.5 Bl	054319	236 12.0 Bl	145 12.3 El	252 11.4 Ht
218 7.4 Ht	243 8.7 Bl	150 9.6 Me	241[12.0 Ht	273 12.5 L	258 11.0 Bl
224 7.5 Ht	252 9.1 Bl	152 9.6 Me	245 12.0 Sl	284 11.7 L	262 10.8 Bl
227 7.3 Bl	T COL	153 9.5 Me	248[12.0 En	RS GEM	265 10.8 En
236 7.2 Bl	*051533*	158 9.6 Me	265[12.0 En	065530	265 10.9 Ht
243 7.9 Bl	126 11.2 En	160 9.6 Me	270 11.7 Bl	150 10.9 Me	270 9.9 Bl
244 7.9 Bl	196 10.2 Ht	282 9.5 L	278 11.5 Bl	160 10.9 Me	278 9.3 Bl
252 7.8 Bl	199 9.7 Bl	286 9.6 Pt	282 11.5 Ht	Z CMA	W PUP
262 8.1 Bl	208 9.9 Ht	288 9.6 Pt	X AUR	*065911*	*074241*
V TAU	210 9.6 Bl	S COL	060450	224 9.0 Sl	126 8.5 En
044617	227 8.9 Bl	*054331*	226 8.3 L	236 9.0 Sl	196 11.7 Ht
153 10.1 Me	236 8.3 Bl	126 12.2 En	249 9.5 L	252 9.6 Sl	199 11.2 Bl
286 9.9 Pt	244 8.3 Bl	196 8.9 Ht	270 11.4 L	R GEM	206 10.7 En
R ORI	S AUR	199 9.1 Bl	284 12.0 L	070122a	209 10.1 En
045307	052034	208 8.7 Ht	286 11.8 Pt	150 7.9 Me	209 11.8 Ht
284 12.6 L	286 10.2 Pt	210 8.8 Bl	V AUR	R VOL	210 9.7 Bl
R LEP	W AUR	218 9.1 Ht	061647	*070772*	216 9.7 En
045514	052036	227 9.6 En	145 11.0 El	126[12.6 En	218 9.4 Ht
226 5.4 Sl	269 10.6 L	236 9.9 En	226 8.7 L	220 13.4 En	220 9.4 En
254 5.4 Sl	280 10.4 El	244 9.8 En	251 9.6 L	223 13.2 En	224 9.1 Ht
V ORI	284 10.7 L	R COL	273 9.7 L	235 13.0 En	227 8.9 Bl
050003	286 10.5 Pt	*054629*	284 9.7 L	236 13.0 Ht	235 8.0 En
284 10.7 L	T ORI	126[12.5 En	AG AUR	241 13.0 Ht	236 8.6 Bl
T LEP	*053005a*	199 12.7 Bl	062047	243 13.0 En	236 8.3 Ht
050022	150 10.1 Me	210 11.7 Bl	226 10.4 L	248 12.6 En	240 8.0 En
126 8.7 En	152 10.2 Me	218 10.3 Ht	251 9.7 L	252 12.6 Ht	241 8.3 Ht
153 9.1 Me	153 10.1 Me	227 8.9 Bl	269 10.0 L	265 12.6 En	243 7.5 En
199 10.3 Bl	158 9.9 Me	236 8.0 Bl	284 10.0 L	265 12.4 Ht	244 8.0 Bl
210 10.8 Bl	159 10.1 Me	244 8.0 Bl	NOV PIC	L_2 PUP	248 7.5 En
S PIC	160 10.4 Me	U ORI	*063462*	*071044*	252 8.1 Bl
050848	S CAM	054920a	125 8.7 En	196 4.0 Sl	252 7.9 Ht
126[12.2 En	053068	286 12.6 Pt	196 8.5 Ht	224 4.3 Sl	258 8.0 Bl
196 8.8 Ht	150 9.8 Me	V CAM	206 8.8 En	236 4.7 Sl	270 9.0 Bl
199 8.4 Bl	234 8.5 Jo	054974	208 8.8 En	245 4.8 Sl	278 9.7 Bl
208 8.7 Ht	237 8.4 Jo	160 10.6 Me	209 8.4 Ht	253 5.1 Sl	V CNC
210 8.5 Bl	280 8.3 El	227 11.9 L	218 8.6 Ht	Z PUP	081617
218 8.9 Ht	281 8.4 Jo	248 12.8 L	220 8.8 En	*072820b*	226 9.0 L
224 8.7 Ht	286 8.7 Pt	256 12.6 Pt	224 8.5 Ht	197[13.7 Bm	

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
RT HYA	V UMA	R CAR	R LMI	Z VEL	S CAR
082405	090151	*092062*	093934	*094953*	*100661*
226 8.3 Ko	153 10.1 Me	218 6.0 Ht	242 7.9 Hf	218 11.2 Ht	125 5.8 En
R CHA	216 11.0 Me	223 6.0 En	243 7.8 Hf	223 11.7 En	131 6.0 En
082476	226 11.0 Jo	224 6.2 Ht	247 7.5 Jo	224 11.9 Ht	196 6.4 Ht
126[12.4 En	227 10.7 L	224 5.9 Sl	248 7.7 Hf	224 11.1 Sl	199 6.7 Bl
206 13.0 En	234 10.9 Jo	224 6.2 En	268 7.7 Sz	227 11.5 Bl	208 7.5 En
209 12.6 En	237 11.2 Jo	227 6.1 Bl	RR HYA	235 12.0 En	209 7.5 Ht
211 12.6 Bl	237 10.3 Mc	236 6.2 Bl	*094023*	236 12.2 Bl	210 7.4 Bl
216 12.4 En	238 10.2 Mc	236 6.4 Sl	125 12.8 En	236 12.1 Ht	216 7.6 En
220 12.4 Ht	240 10.8 Jo	236 6.4 Ht	197 9.2 Bm	241 12.4 Ht	218 7.5 Ht
223 12.4 En	244 10.5 Mc	241 6.6 Ht	204 9.3 Bm	243 12.3 En	223 7.7 En
224 12.6 Sl	246 10.9 L	243 6.7 En	207 9.7 Bm	246 12.0 Sl	224 7.8 Ht
227 12.5 Bl	248 10.4 Mc	244 6.4 Bl	208 9.9 En	252 12.5 Ht	224 7.0 Sl
235 12.1 En	254 11.0 L	246 6.5 Sl	213 10.1 Bm	265 13.0 En	227 7.8 Bl
236 12.1 Bl	258 10.8 So	250 6.5 Sl	216 10.6 En	271[12.8 En	235 7.6 En
236 12.0 Ht	261 11.0 L	252 6.5 Bl	219 10.7 Bm	281[12.1 Ht	236 7.6 Bl
239 12.0 En	267 10.8 Mc	252 7.1 Ht	235 11.4 En	V LEO	236 7.8 Ht
240 11.9 En	270 11.0 L	258 6.9 Bl	243 12.0 En	095421	236 7.5 Sl
241 12.0 Ht	279 11.0 L	265 7.3 En	271 13.4 En	236 12.4 Pt	241 7.8 Ht
243 11.6 En	297 10.3 Mc	265 7.7 Ht	R LEO	RR CAR	243 7.5 En
244 11.3 Bl	W CNC	270 8.0 Bl	094211	*095458*	244 7.5 Bl
245 11.3 Sl	090425	271 8.0 En	150 7.8 Me	125 8.2 En	250 6.9 Sl
248 11.3 En	226 11.5 L	278 8.1 Bl	216 9.3 Me	196 7.9 Ht	252 7.1 Ht
252 10.5 Bl	246 11.2 L	279 8.0 En	226 9.4 Jo	208 7.7 En	252 6.9 Bl
252 10.7 Ht	RW CAR	281 8.3 Ht	230 9.2 Wa	209 7.8 Ht	258 6.6 Bl
254 10.8 Sl	*091868*	X HYA	234 9.5 Jo	216 7.8 En	265 6.6 En
258 9.5 Bl	125 9.4 En	*093014*	234 8.1 Pa	218 8.0 Ht	265 6.8 Ht
265 10.1 En	131 9.4 En	197 11.8 Bm	235 10.1 Mc	224 7.7 Ht	270 6.7 Bl
265 9.5 Ht	211[12.8 Bl	204 11.8 Bm	236 9.9 Pt	235 7.4 En	271 6.5 En
270 9.6 Bl	216[12.8 En	207 11.8 Bm	237 9.3 Ra	236 7.3 Ht	278 6.7 Bl
272 9.0 En	223[12.8 En	213 11.7 Bm	237 10.2 Mc	241 7.5 Ht	279 6.2 En
276 9.0 En	237[12.8 Bl	219 11.8 Bm	237 9.6 Jo	243 7.5 En	281 6.6 Ht
278 9.2 Bl	241[12.8 Ht	Y DRA	238 8.0 Pa	252 7.5 Ht	U UMA
279 8.8 En	252[12.8 Ht	093178	240 9.8 Jo	265 7.8 En	100860
281 9.0 Ht	265[12.8 En	227 9.4 L	242 9.9 Oy	265 7.7 Ht	241 6.3 Se
U CNC	281[12.8 Ht	232 9.7 Wr	247 9.4 Wa	271 7.7 En	267 6.6 Mn
083019	Y VEL	234 9.3 Cy	1 CAR	279 7.7 En	274 6.6 Mn
226 11.0 L	*092551*	241 9.6 Cy	*094262*	281 7.7 Ht	281 6.5 Mn
X UMA	125 12.4 En	246 10.0 L	224 4.0 Sl	RV CAR	Z CAR
083350	199 12.9 Bl	254 10.1 L	236 3.5 Sl	*095563*	*101058a*
233 10.0 Mg	210 12.8 Bl	257 10.6 Cy	246 3.7 Sl	125[12.5 En	126 10.7 En
236 10.3 Pt	237[12.9 Bl	261 10.7 L	250 3.9 Sl	131[12.5 En	131 10.9 En
237 9.9 Jo	241[12.9 Ht	265 11.1 Wr	Y HYA	196 11.8 Ht	195 12.4 Cp
238 10.0 So	252[12.9 Ht	266 10.9 Cy	*094622*	199 11.8 Bl	199 12.3 Bl
240 9.9 Jo	265[12.9 Ht	270 11.0 L	125 8.0 En	208 11.8 En	209 12.5 En
241 9.7 Oy	271[12.9 En	279 11.7 L	208 8.0 En	209 12.7 Ht	210 12.5 Bl
246 9.7 Jo	281[12.1 Ht	R LMI	235 7.2 En	210 11.8 Bl	210 12.6 Cp
S PYX	R CAR	093934	243 6.7 En	216 11.8 En	216 12.6 Cp
090024	*092962*	230 8.0 Jo	271 7.5 En	220 12.9 Ht	220[12.6 Ht
204 13.8 Bm	125 7.0 En	234 7.4 Se	Z VEL	224 13.1 En	235[12.6 En
207 13.0 Bm	131 6.6 En	236 7.7 Pt	*094953*	227 12.3 Bl	237 12.8 Bl
213 12.8 Bm	196 5.3 Ht	236 7.5 Ra	125 9.9 En	236 12.8 Bl	252[12.3 Ht
219 12.3 Bm	198 5.1 Sl	237 7.8 Jo	131 9.5 En	236 13.1 Ht	265[12.6 Ht
T PYX	199 4.9 Bl	237 7.9 Hf	196 10.8 Ht	243 13.1 En	281[12.3 Ht
090031	206 4.9 En	239 7.9 Hf	199 10.7 Bl	244 13.0 Bl	W VEL
211 [t Bl	208 5.4 En	240 7.6 Jo	208 11.1 En	252[13.1 Ht	*101153*
237 [t Bl	209 5.8 Ht	241 7.3 Se	209 11.1 Ht	265[13.1 Ht	125[12.0 En
278 [s Bl	210 5.5 Bl	241 8.1 Ad	210 10.9 Bl	271[13.1 En	131[12.0 En
	216 6.0 En		216 11.5 En	281[13.1 Ht	

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1933.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
W VEL	R UMA	W LEO	X CEN	W CEN	R CRV
101153	103769	104814	*114441*	*115058*	*121418*
199 11.6 Bl	242 10.2 Hf	207[13.5 Bm	209 9.5 Ht	271 8.8 En	246 7.8 Jo
209 11.8 Ht	243 10.7 Fd	219[14.1 Bm	209 9.5 En	278 9.4 Bl	246 7.8 An
209 11.7 En	244 10.2 Mc	233[13.3 Mg	210 9.5 Bl	279 9.5 En	246 7.6 Sl
210 11.5 Bl	244 10.0 Ah	236[12.7 Pt	216 9.6 En	281 9.5 Ht	246 8.1 L
216 11.6 En	246 9.8 Jo	242[13.5 L	220 10.0 Ht	R COM	247 8.1 Hf
218 11.4 Ht	246 9.9 Bc	RS CAR	227 9.8 Bl	115919	267 8.0 Pt
224 10.9 Ht	248 10.0 Mc	*110361*	236 10.4 Bl	232 10.1 Cy	SS VIR
227 10.6 Bl	251 10.0 We	126[12.3 En	237 11.1 En	233 10.5 Mg	122001
235 10.0 En	251 10.8 Hi	265[12.3 En	240 10.8 Ht	234 11.2 Jo	227 6.8 L
236 10.0 Ht	252 10.1 Sz	S LEO	243 11.1 En	238 11.4 Jo	234 6.8 Jo
236 10.3 Bl	252 10.1 Cy	110506	245 10.7 Bl	242 10.7 Cy	237 7.1 Jo
241 10.0 Ht	257 10.7 So	233 10.4 Mg	252 11.3 Bl	251 10.2 We	237 7.5 Mg
243 9.5 En	259 10.0 An	234 10.0 Cy	252 11.4 Ht	271 11.8 Cy	239 6.9 Ko
244 9.8 Bl	266 10.9 Hi	236 11.6 Pt	258 11.6 Bl	SU VIR	240 7.3 Jo
252 9.7 Bl	266 10.9 Cy	241 10.1 Cy	265 12.2 En	120012	242 7.6 Ra
252 9.8 Ht	266 11.0 Jo	242 10.4 L	271 12.6 En	237 13.2 Mg	243 7.0 L
258 9.3 Bl	266 11.2 Pi	250 10.3 L	278 12.1 Bl	238 13.3 L	246 7.3 Jo
265 9.3 En	266 11.0 O	RY CAR	279 12.2 En	242 12.3 Cy	247 7.0 Ko
265 9.3 Ht	267 11.0 Pt	*111561*	AD CEN	250 12.5 L	250 7.0 L
270 9.4 Bl	270 11.2 Fd	126[12.7 En	*114858*	261 11.9 L	252 6.8 Sz
271 9.3 En	271 11.0 We	131[12.7 En	131 9.1 En	263 11.3 Bw	257 6.9 Ko
278 9.4 Bl	271 11.0 So	206[13.1 En	196 9.3 Ht	265 11.8 El	257 6.6 L
279 9.3 En	272 11.3 Mc	210[13.5 Bl	209 9.4 Ht	267 11.7 Pt	263 7.5 So
281 9.5 Ht	275 11.0 Cy	216[13.1 En	220 9.5 Ht	270 11.6 L	266 7.5 El
U HYA	277 11.4 Wd	220[13.1 Ht	236 9.7 Ht	271 11.1 Cy	266 7.0 Ko
103212	279 11.3 Hi	237[13.5 Bl	241 9.6 Ht	279 11.0 L	268 7.0 Sz
215 5.5 Ka	282 10.9 Sz	243[13.1 En	252 9.6 Ht	T VIR	270 7.0 L
217 5.6 Ka	283 11.3 Cy	252[13.1 Ht	265 9.4 Ht	*120905*	275 6.9 Ko
218 5.5 Ka	284 11.4 We	265[13.1 En	279 9.1 En	236[12.5 Pt	T CVN
RZ CAR	290 11.8 Hf	279[13.1 En	281 9.5 Ht	237[12.8 Mg	122532
103270	290 11.7 Wd	281[13.1 Ht	W CEN	242 14.0 L	226 11.2 Cy
125[12.4 En	294 11.7 Wd	RS CEN	*115058*	267[11.8 Pt	230 12.1 Wa
131[12.4 En	294 11.8 Hf	*111661*	126 12.4 En	R CRV	234 10.8 Hi
209[13.6 Ht	V HYA	131 12.3 En	131 12.6 En	*121418*	234 11.2 Cy
216[13.1 En	*104620*	196 9.4 Ht	196 12.6 Ht	197 9.6 Bm	237 11.6 Pt
217[12.7 Cp	199 6.8 Bl	199 9.5 Bl	199 12.3 Bl	207 9.0 Bm	238 11.0 Rc
220[13.6 Ht	210 6.5 Bl	206 9.5 En	208 11.7 En	213 9.0 Bm	238 10.7 Jo
236[13.6 Ht	226 6.8 Ko	209 9.9 En	209 11.5 En	219 8.1 Bm	241 10.8 Hi
241[13.6 Ht	227 6.5 Bl	209 10.1 Ht	209 11.5 Ht	224 8.3 Sl	241 10.9 Cy
252[13.1 Ht	235 6.6 En	210 9.6 Cp	210 11.0 Cp	226 8.0 Jo	244 11.1 Rc
265[13.6 En	236 6.2 Pt	216 10.5 En	210 11.3 Bl	227 8.2 L	251 11.2 Jo
279[13.6 En	236 6.0 Bl	217 10.5 Cp	216 10.5 En	232 8.3 Cy	251 10.9 Hi
281 12.9 Ht	243 6.5 En	220 11.2 Ht	220 10.3 Ht	234 8.3 Jo	251 10.8 Cy
R UMA	244 6.5 Bl	221 11.1 En	223 9.7 En	235 7.9 Mc	263 11.3 Rc
103769	252 6.5 Bl	223 11.6 En	227 9.7 Bl	237 8.0 Mc	265 10.9 Hi
226 9.0 Jo	258 6.2 Bl	227 11.8 Bl	235 9.5 En	237 7.8 Pt	266 11.0 Cy
232 9.5 Cy	265 6.8 En	235 12.7 En	236 9.3 Bl	237 8.1 Hf	267 11.4 Rc
234 9.5 Jo	271 7.1 En	236 13.1 Ht	236 9.5 Ht	238 8.0 Jo	267 11.1 Pt
234 9.9 Hi	278 6.8 Bl	237 13.0 Bl	237 9.4 En	239 8.2 Mc	268 10.5 Jo
236 9.8 Ah	279 6.7 En	241 13.3 Ht	241 9.3 Ht	239 7.5 Cy	277 11.2 Jo
236 9.2 Pt	RS HYA	243 13.5 En	243 9.2 En	239 8.2 Hf	279 10.8 Hi
237 10.0 Hf	*104628*	265[13.1 Ht	244 9.2 Bl	240 7.9 Jo	279 11.3 Rc
237 9.5 Jo	210[13.7 Bl	279 13.1 En	252 9.0 Bl	241 8.2 Hf	293 11.2 Rc
237 9.7 Mc	235 13.4 En	X CEN	252 8.6 Ht	241 7.8 Oy	298 11.1 Rc
238 9.8 Mc	243[13.0 En	*114441*	254 8.6 En	241 7.9 Ad	Y VIR
238 9.6 Cy	271[12.5 En	126 11.8 En	258 9.0 Bl	244 8.6 Sq	*122803*
240 9.7 Jo		196 8.5 Ht	265 8.4 En	244 8.2 Mc	197 10.6 Bm
241 9.8 We		199 8.8 Bl	265 8.9 Ht	245 8.3 Mc	207 9.4 Bm

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1933.

J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.
Y VIR		**R VIR**		**RS UMA**		**S UMA**		**U VIR**		**V VIR**	
122803		123307		123459		123961		124606		*132202*	
219	9.8 Bm	239	9.6 Mc	291	11.2 Wd	270	8.2 Ra	237	10.3 Mg	234	8.7 L
234	9.8 L	240	8.7 Jo	294	11.3 Wd	271	7.8 Jo	237	10.9 Pt	236	10.4 Jo
237	9.7 Mg	241	9.1 Oy	294	11.4 Hf	271	8.2 So	242	10.9 L	237	9.0 Mg
244	10.0 We	241	9.1 Hf	299	11.1 Mc	271	8.4 We	250	11.5 L	237	9.1 Hf
246	9.5 L	241	9.2 Rc	**S UMA**		272	8.5 Mc	251	12.0 Hi	239	9.1 Ko
254	9.9 L	242	9.1 Hf	123961		272	8.2 Ah	263	12.3 L	240	10.6 Jo
261	10.1 L	244	9.0 Mc	226	7.4 Jo	273	8.9 An	267	12.6 Pt	242	9.1 Cy
270	10.3 L	244	9.0 Rc	228	7.4 Ah	273	8.4 Hf	270	12.7 L	243	9.2 Hf
U CEN		244	8.5 We	232	7.7 Wr	274	8.6 Wr	**RV VIR**		245	9.2 Ko
122854		245	9.1 Mc	234	7.1 Jo	274	8.6 Mn	*130212*		246	8.9 L
196	8.3 Ht	246	8.4 Jo	235	7.3 Bc	277	8.4 Mc	238	13.8 Bw	252	9.4 Ko
199	8.5 Bl	247	9.0 Hl	235	7.3 Bf	277	8.5 Ah	250	14.0 L	253	9.2 Fn
208	8.9 Ht	248	9.0 Mc	235	7.5 Ra	277	8.7 Wd	266	13.1 Bw	254	9.1 L
209	9.3 En	249	8.7 Rc	236	7.1 He	280	8.6 Ah	271	11.9 L	258	9.4 L
210	9.0 Cp	251	8.2 Jo	236	7.2 Ah	281	8.8 Jo	**U OCT**		263	9.5 Fn
210	9.0 Bl	253	8.2 Oy	237	7.1 Jo	281	9.0 Mn	*131283*		265	9.8 Ko
216	10.1 En	256	8.2 Rc	237	8.0 Mc	283	9.0 Wd	209	13.2 Ht	266	9.9 Cy
220	9.9 Ht	261	7.5 Hf	237	7.3 Pt	283	8.8 Hf	211	13.6 En	269	9.6 Fn
227	10.5 Bl	262	7.9 Rc	237	7.4 Hf	283	8.9 Hv	211	13.3 Bl	270	9.4 L
236	11.4 Bl	266	7.4 Hf	238	7.8 Mc	284	9.0 Wd	220	13.6 En	275	10.0 Ko
236	10.6 Ht	267	7.6 Rc	239	7.7 Mc	284	8.5 We	220	12.9 Ht	279	9.9 L
237	11.1 En	267	7.3 Hf	239	7.7 Hf	285	9.1 An	227	12.7 Bl	**R HYA**	
241	12.3 Ht	267	7.2 Sh	240	6.9 Jo	289	9.1 Wd	236	11.9 Bl	*132422*	
243	12.1 En	267	7.5 Pt	240	7.1 Ah	290	9.2 O	236	11.6 En	196	4.2 Ht
244	12.2 Bl	268	8.2 Sz	241	8.0 We	291	9.2 Wd	236	12.1 Ht	199	4.4 Bl
252	12.3 Ht	270	7.0 Ra	241	7.6 Ad	291	9.1 Sh	241	12.1 Ht	208	4.5 Ht
265	12.3 Ht	272	7.1 Mc	242	7.7 Hf	292	9.2 Hf	244	10.8 Bl	209	4.7 En
271	12.3 En	273	7.1 Oy	243	7.2 Fd	294	9.3 Wd	248	11.5 En	210	4.8 Bl
281	12.3 Ht	275	7.1 Rc	244	7.6 Sq	294	9.3 Hf	252	11.7 Bl	211	4.8 En
T UMA		277	6.8 Mc	244	6.8 Pa	297	9.2 Mc	252	11.5 Ht	218	4.8 Ht
123160		280	7.2 Hl	244	7.9 Mc	299	9.6 Mc	258	11.1 Bl	220	5.4 En
226	10.0 Jo	281	7.0 Rc	244	7.2 Ah	299	10.1 O	265	10.8 En	224	5.2 Ht
232	10.8 Wr	284	6.9 Rc	244	7.6 Hf	303	9.9 Mc	271	10.7 En	226	5.0 Ko
234	10.3 Jo	286	6.8 Rc	245	7.8 Mc	**RU VIR**		276	10.5 En	226	5.1 L
236	11.3 Ah	290	6.8 Rc	246	7.2 Jo	124204		278	10.6 Bl	227	4.8 Bl
237	10.6 Jo	291	7.0 Hf	248	7.9 Mc	226	12.1 L	282	10.3 Ht	234	5.2 Jo
237	11.2 Pt	293	6.9 Rc	251	8.0 We	234	12.1 Cy	**W VIR**		234	5.3 Ko
240	10.8 Ra	**RS UMA**		252	7.4 Sz	234	12.4 Lg	*132002*		234	5.3 Se
240	10.8 Jo	123459		257	8.2 So	236	11.8 Jo	234	9.7 Ko	235	5.6 We
243	11.8 Fd	152	12.3 Bn	257	8.1 An	237	12.4 Pt	234	9.8 Fn	236	5.5 En
244	11.0 Sg	157	12.4 Bn	257	7.7 Ad	237	12.1 Mg	237	9.7 Hf	236	5.4 Bl
244	11.4 Ah	162	12.8 Bn	260	8.0 Sh	238	12.1 Bw	237	10.4 Mg	236	5.6 Ht
246	11.3 Jo	219	14.4 Bm	260	8.1 Hf	239	12.2 Jo	239	10.4 Ko	237	5.8 Pt
266	12.4 El	244	10.5 Sq	260	8.2 Hv	242	12.1 L	243	9.8 Hf	239	5.6 Se
267	12.0 Pt	254	13.3 Ry	263	8.3 Ra	242	11.8 Cy	245	9.6 Ko	241	5.7 Ht
271	12.3 So	257	13.4 Ry	263	7.5 Pi	250	11.9 L	246	9.6 Ko	241	5.8 Se
R VIR		266	12.8 Ry	263	7.8 Jo	257	11.4 L	247	9.5 Ko	242	5.7 Ko
123307		266	12.8 El	263	7.4 O	263	11.2 Bw	248	9.5 Ko	242	5.1 L
234	10.4 Hl	267	13.0 Pt	264	7.9 Sh	266	10.9 Cy	252	9.7 Ko	244	5.3 Bl
235	9.8 Mc	270	12.5 Ry	265	8.2 Mc	266	11.2 El	253	9.9 Fn	246	6.0 Jo
236	9.4 Jo	271	13.5 So	265	8.0 El	267	11.7 Pt	263	9.3 Fn	248	5.4 Be
236	9.9 Ah	273	12.4 Ry	266	8.0 Pa	271	11.4 L	269	9.8 Fn	248	5.6 En
237	9.5 Pt	277	12.1 Ry	267	8.5 Mc	271	11.5 Be	**V VIR**		250	5.5 We
237	9.6 Ra	279	12.4 Bn	267	7.8 Pt	**U VIR**		*132202*		252	5.9 Ht
237	9.7 Hf	281	11.9 Ry	268	8.5 Sz	124606		226	8.4 Ko	253	5.9 L
239	9.3 Rc	286	12.0 Bn	268	8.3 Hf	227	9.7 L	234	8.9 Ko	253	5.6 Bl
		290	11.4 Hf	268	7.9 Sh	234	10.5 Hi	234	9.1 Cy	258	6.2 Bl
		290	11.2 Wd	269	8.5 Mn	236	10.8 Ah	234	8.9 Fn	266	6.0 En

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J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.
R HYA		**RV CEN**		**RT CEN**		**T APS**		**R CEN**		**U UMI**	
132422		*133155*		*134236*		*134677*		*140959*		141567	
267	5.9 Pt	236	8.0 En	236	8.8 En	253	8.9 Bl	131	10.3 En	270	10.8 Fd
271	6.0 En	236	7.7 Ht	240	9.3 Ht	258	8.8 Bl	196	10.8 Ht	275	12.0 Cy
276	6.0 En	241	8.0 Ht	244	9.1 Bl	266	9.5 En	200	10.5 Bl	279	11.8 Hi
278	7.1 Bl	244	7.6 Bl	248	9.0 En	271	9.5 En	206	10.7 En	280	12.0 El
281	6.8 Ht	248	8.0 En	252	9.6 Ht	276	9.5 En	208	10.8 Ht	281	11.0 Jo
S VIR		252	8.2 Bl	254	9.0 En	278	9.4 Bl	210	10.4 Bl	283	11.7 Cy
132706		252	8.4 Ht	258	9.1 Bl	282	10.5 Ht	210	10.1 Sl	**S BOO**	
196	10.8 Ht	258	7.7 Bl	266	9.3 En	**RR VIR**		211	10.6 En	141954	
208	10.7 Ht	266	8.6 En	271	9.1 En	*135908*		220	10.3 En	237	13.2 Pt
218	10.5 Ht	276	8.4 En	276	9.4 En	237	13.6 Mg	220	10.6 Ht	240	13.1 Mg
220	9.6 En	278	8.6 Bl	278	9.3 Bl	267	11.5 Pt	224	10.0 En	242	12.9 L
224	10.0 Ht	281	8.6 Ht	281	10.0 Ht	**Z BOO**		225	9.2 Sl	248	12.9 Be
234	9.1 Wa	**T UMI**		**R CVN**		140113		227	9.3 Bl	250	12.7 L
236	9.5 Jo	132273		134440		234	13.8 L	235	9.9 En	262	12.3 L
236	9.4 En	246	[14.2 L	237	11.7 Pt	246	13.3 L	236	9.1 Bl	267	12.0 Pt
236	9.7 Ht	266	[14.3 El	240	11.5 Jo	254	13.1 L	236	10.1 Ht	269	12.0 B
237	9.5 Mg	270	[12.0 Fd	240	11.8 Mg	261	12.0 L	237	9.5 En	270	12.1 L
237	9.7 Pt	280	[14.3 El	242	11.2 Gs	264	11.4 El	240	9.2 En	271	11.3 An
237	10.0 Hf	**T CEN**		243	11.0 We	270	10.9 L	241	9.6 Ht	273	11.1 Sg
239	9.9 Hv	*133633*		246	11.7 Jo	273	10.2 Mg	245	8.8 Bl	277	11.3 Bg
241	9.7 Oy	196	7.4 Ht	247	11.5 Hl	273	10.0 Gr	246	8.0 Sl	280	10.8 An
241	9.3 Ht	199	6.8 Bl	258	11.9 So	280	10.0 El	252	9.1 Ht	281	11.2 L
243	9.9 Hf	208	6.8 Ht	267	12.0 Pt	280	9.8 L	252	8.8 En	291	10.4 O
244	9.7 Ra	210	6.5 Bl	268	11.5 Jo	**Z VIR**		253	8.1 Bl	294	10.4 Hf
246	9.3 Jo	211	6.5 En	270	11.1 Fd	*140512*		254	8.3 En	294	10.5 Wd
248	9.5 En	220	6.2 Ht	271	11.9 So	226	9.9 L	258	8.1 Bl	**RS VIR**	
247	9.0 Sq	220	6.4 En	275	10.6 Wa	237	9.9 Mg	265	7.9 Ht	142205	
252	9.1 Ht	224	6.2 Sl	281	11.0 Jo	237	10.3 Pt	266	7.6 En	197	12.3 Bm
253	9.0 Oy	227	6.0 Bl	292	10.7 O	239	10.5 Jo	271	7.5 En	207	12.6 Bm
260	8.4 Hf	236	6.3 Bl	**RX CEN**		242	10.4 L	276	7.0 En	219	12.6 Bm
261	8.2 Hf	236	6.0 En	*134536*		246	11.4 Jo	278	7.3 Bl	242	12.1 L
263	8.2 HS	240	6.2 Ht	208	[13.1 Ht	248	10.9 Be	281	7.1 Ht	250	11.9 L
266	7.6 HS	244	6.3 Bl	211	[13.1 Bl	250	11.2 L	283	7.0 En	261	11.4 L
266	8.0 Hf	246	5.9 Sl	220	[13.1 En	258	11.4 L	**U UMI**		269	10.3 Be
266	8.0 En	248	6.3 En	237	[13.1 Bl	267	11.8 Pt	141567		270	10.3 L
267	7.8 Pt	250	6.1 Sl	240	[13.1 Ht	270	11.8 L	150	7.3 Me	280	9.1 L
268	7.8 Sz	250	6.3 Bh	248	13.1 En	280	12.5 L	218	10.2 Me	**V BOO**	
270	8.0 Ra	252	6.7 Ht	252	13.1 Ht	**RU HYA**		226	10.1 Cy	142539a	
271	7.3 Bh	253	6.5 Bl	254	12.6 En	*140528*		234	10.5 Cy	150	9.4 Me
271	7.6 En	258	6.9 Bl	271	11.8 En	196	8.8 Ht	234	10.0 Jo	226	8.9 Cy
273	7.6 Hf	266	6.6 En	276	11.6 En	199	8.7 Bl	234	10.5 Hi	232	8.8 Cy
273	7.6 Oy	271	6.9 En	278	10.9 Bl	208	8.2 Ht	237	10.2 Pt	232	8.6 Jo
276	7.0 En	271	7.2 Bh	281	11.0 Ht	210	8.5 Bl	240	10.4 Jo	232	9.1 GD
281	7.2 Ht	276	7.1 En	**T APS**		211	8.2 En	240	10.7 Ah	234	9.1 GD
291	6.6 Hf	278	7.5 Bl	*134677*		220	7.9 Ht	242	10.6 Cy	237	8.5 Jo
RV CEN		281	7.8 Ht	209	13.1 Ht	227	8.5 Bl	242	10.6 Gs	237	9.1 GD
133155		**RT CEN**		210	12.8 Bl	236	8.9 Bl	242	10.0 We	237	8.9 Pt
196	7.3 Ht	*134236*		211	12.3 En	237	8.3 En	242	10.8 Sf	238	9.1 GD
199	7.5 Bl	196	10.4 Ht	220	11.2 En	240	8.8 Ht	242	10.7 Hf	238	9.0 Mc
208	7.6 Ht	199	9.8 Bl	220	11.0 Ht	245	8.8 Bl	247	10.7 Jo	238	8.9 Cy
209	7.4 En	208	9.8 Ht	227	10.3 Bl	248	8.9 En	251	10.3 We	238	9.1 So
210	7.7 Bl	210	9.6 Cp	236	9.3 Bl	252	9.3 Ht	251	10.8 Cy	239	8.9 Hf
211	7.3 En	210	9.6 Bl	236	9.7 Ht	253	8.9 Bl	254	11.0 Hi	239	8.8 Hv
220	7.7 Ht	211	9.6 En	237	9.6 En	258	8.9 Bl	264	11.2 El	240	8.3 Jo
220	7.3 En	220	9.5 En	241	9.7 Ht	266	9.2 En	265	11.0 We	240	8.9 Ah
224	7.6 En	220	9.8 Ht	244	9.0 Bl	272	9.6 En	265	11.4 Hi	240	9.2 Ra
227	7.5 Bl	227	9.2 Bl	248	9.3 En	276	10.3 En	266	11.3 Cy	241	9.2 We
236	7.8 Bl	236	9.0 Bl	252	9.2 Ht	278	10.1 Bl	267	11.6 Pt	242	8.8 Oy

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1933.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
V Boo	R CAM	U Boo	S APS	S SER	RU LIB
142539a	042584	144918	*145971*	151714	*152714*
243 10.0 Fd	226 9.2 Cy	234 11.6 Fn	282 10.4 Ht	263 12.6 Bw	246 9.9 Jo
244 8.8 Hf	234 9.6 Cy	240 11.7 Mg	283 10.1 En	263 12.8 L	246 10.1 An
244 8.9 Ah	238 8.6 Jo	242 11.3 Cy	RT LIB	264 12.7 El	247 10.0 Hl
245 9.3 Mc	240 8.4 Jo	247 11.0 Jo	*150018*	*267* 12.5 Pt	248 9.8 Be
247 8.8 Sq	241 8.8 Oy	251 11.5 Cy	*237* 12.8 Pt	268 12.8 Bw	250 9.7 L
248 9.4 Mc	242 9.0 Cy	253 11.4 Fn	240 13.0 Mg	270 12.7 Mg	252 9.5 We
251 9.0 Cy	251 9.2 Cy	263 11.6 Bw	270 13.4 Mg	*272* 12.5 L	253 9.7 Oy
252 8.7 We	*267* 9.0 Cy	264 11.6 El	T LIB	*273* 12.5 Be	261 9.3 L
257 8.5 So	274 9.1 Cy	*267* 11.4 Cy	*150519*	280 12.3 L	266 8.7 Bw
257 8.5 Sf	276 8.5 Oy	269 11.4 Fn	237[13.0 Pt	280 12.6 El	267 8.6 Pt
257 8.0 An	279 8.7 Hi	277 11.4 Cy	240[14.0 Mg	S CRB	271 8.6 An
257 7.7 Ad	287 8.4 Br	280 11.5 El	250[14.0 L	151731	*272* 8.8 L
260 8.3 Sh	290 8.4 O	Y LUP	264 14.0 L	236 13.5 Wr	*273* 8.5 Oy
260 8.4 Hf	R Boo	*145254*	*270* 13.1 Mg	*237* 13.0 Pt	279 8.4 Hl
263 7.8 Jo	143227	208 13.0 Ht	281 12.7 L	*266* 12.9 El	280 8.7 An
265 8.8 GD	236 12.3 Wr	211 13.7 En	Y LIB	267 12.8 Pt	280 8.3 L
266 8.8 GD	*237* 12.3 Pt	220[13.7 En	*150605*	*271* 12.8 Rl	290 7.6 Wd
266 7.5 Pa	240 12.1 Mg	*237*[13.7 Bl	144 10.0 Tw	275 12.5 Ko	290 7.4 Hf
266 8.0 Sf	*272* 9.6 Ah	248[13.7 En	*226* 9.9 L	278 12.6 El	291 7.4 Hf
267 9.6 Mc	*272* 10.7 We	*272*[13.7 En	*237* 10.5 Pt	302 12.3 Mc	R NOR
267 7.8 Pt	*273* 9.4 Ra	S APS	*239* 11.0 We	RS LIB	*153849*
268 7.7 Jo	*277* 9.6 Ah	*145971*	*240* 9.9 Mg	*151822*	196 8.3 Ht
268 8.1 Hf	*277* 9.0 Jo	196 10.4 Ht	241 10.2 Oy	196 11.0 Ht	200 8.5 Bl
268 8.8 GD	278 10.0 We	200 10.6 Bl	*242* 10.3 L	200 10.5 Bl	208 8.3 Ht
269 8.8 GD	280 9.0 Ah	206 10.6 En	242 10.7 Cy	208 11.3 Ht	210 8.8 Bl
270 7.3 Fd	281 9.1 Jo	209 10.6 Ht	247 10.7 Jo	210 11.4 Bl	211 8.3 En
270 8.0 Ra	*291* 8.6 O	210 10.7 Bl	248 10.4 Be	211 11.5 En	220 8.7 Ht
271 8.1 An	294 8.6 Hf	210 10.4 Sl	250 10.7 L	*220* 11.5 Ht	228 8.4 Bl
272 7.9 Ah	294 8.7 Wd	211 10.7 En	251 11.0 Cy	*220* 11.5 En	236 9.0 Bl
272 7.9 We	V LIB	220 10.4 Ht	258 11.3 L	*228* 11.3 Bl	*237* 9.0 En
276 7.4 Oy	*143417*	220 10.6 En	264 12.0 Pk	236 11.1 Bl	240 8.9 Ht
277 7.8 Hv	236 10.4 Jo	223 10.4 En	*267* 12.0 Cy	*237* 11.4 En	248 8.9 En
277 7.6 Ah	240 10.7 Jo	*225* 10.3 Sl	*267* 12.2 Pt	240 11.5 Ht	252 9.1 Ht
277 7.6 Jo	242 10.7 Cy	*227* 10.5 Bl	*270* 12.0 Mg	242 11.5 L	*253* 9.1 Bl
277 9.2 Mc	242 10.9 L	236 10.4 Bl	*272* 12.3 L	245 11.3 Bl	259 8.9 Bl
278 8.0 We	247 11.0 Jo	236 10.4 Ht	*273* 12.2 Be	250 11.2 L	266 9.4 En
278 8.8 GD	250 11.1 L	*237* 10.5 En	280 12.6 L	251 11.5 En	*272* 9.4 En
280 7.7 An	252 10.0 We	237 10.5 Bl	S LIB	252 11.5 Ht	279 10.0 Bl
280 7.7 Ah	261 11.7 L	239 10.4 En	*151520*	253 11.1 Bl	282 10.0 Ht
282 7.3 Jo	*264* 12.1 El	240 10.5 En	*228* 10.3 L	258 10.7 Bl	X LIB
282 8.8 GD	271 12.4 Cy	241 10.4 Ht	*237* 10.0 Pt	261 11.2 L	*153020*
283 8.6 GD	*272* 12.2 L	243 10.4 En	239 9.0 We	265 10.9 Ht	236 12.5 Bl
288 8.6 GD	S LUP	244 10.4 Bl	242 10.2 L	266 10.9 En	242 12.2 L
289 8.6 GD	*144646a*	245 10.5 Bl	250 9.9 L	*272* 10.1 L	250 11.6 L
290 8.5 GD	208[12.1 Ht	246 10.4 Sl	258 9.5 L	274 10.2 En	253 11.4 Bl
290 7.5 Hf	220[12.1 En	248 10.4 En	267 8.5 Pt	279 9.9 Bl	258 10.8 Bl
290 7.5 Wd	*237*[12.1 En	252 10.7 En	*272* 9.0 L	280 9.8 L	*262* 10.7 Bl
291 7.5 Sh	240[12.1 Ht	252 10.6 Bl	280 8.8 L	RU LIB	*262* 10.8 L
291 7.5 O	*272*[12.1 En	252 10.3 Ht	S SER	*152714*	*272* 10.7 L
292 7.5 Sq	X LUP	253 10.6 Bl	151714	154 9.1 Tw	279 11.1 Bl
292 7.4 Hf	*144646b*	254 10.7 En	*242* 13.2 Mg	228 10.4 L	280 11.0 L
293 8.5 GD	208[12.1 Ht	258 10.6 Bl	242 12.9 L	234 10.3 Hl	W LIB
296 7.3 Ra	220[12.1 Ht	*262* 10.5 Bl	248 13.0 Be	*237* 10.2 Pt	*153215*
297 8.5 Mc	240[12.1 Ht	265 10.3 Ht	250 13.0 L	238 10.3 Bw	211[13.0 Bl
299 7.5 Sf	252[12.1 Ht	266 10.3 En		241 10.2 Oy	237 13.1 Bl
302 8.6 Mc	U Boo	271 10.4 En		242 9.5 We	246[11.0 An
	144918	276 10.1 En		243 9.7 L	
	226 11.2 Cy	278 10.5 Bl		244 10.1 O	

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
W LIB	R CrB	R CrB	R CrB	R CrB	R CrB
153215	154428	154428	154428	154428	154428
250[14.3 L	211 5.2 Sg	239 5.7 Ko	246 5.9 Ko	263 6.0 Ra	272 6.2 An
262 13.0 Bl	216 5.8 Me	239 5.9 Pt	246 6.0 O	263 6.0 Jo	272 5.9 L
272 10.8 We	217 5.9 Me	239 5.9 Se	246 6.0 L	263 6.0 Pi	273 5.9 Ko
279 11.0 Hl	218 6.0 Me	239 6.0 Be	246 5.9 Bc	263 6.0 O	273 6.4 Gs
S UMi	225 5.8 Rb	240 6.0 Lg	246 5.8 Pt	263 6.1 HS	273 6.0 Cy
153378	226 6.0 Cy	240 5.8 Jo	247 5.9 Pt	264 6.0 Sh	273 6.0 Jo
150 9.7 Me	226 5.8 Jo	240 6.0 Mg	247 6.0 Lg	264 6.0 Mg	273 5.7 Ru
160 9.6 Me	226 5.9 Ko	240 6.1 Ah	247 6.0 Jo	264 6.1 An	273 6.0 Mg
218 8.2 Me	226 6.0 Be	240 6.0 Bc	247 6.0 Ko	265 6.0 Ra	273 6.0 Hf
226 8.2 Jo	226 6.0 L	240 6.0 Bf	247 5.8 Se	265 6.0 L	273 6.2 Gr
237 8.4 Jo	228 6.0 L	241 6.0 Lg	247 6.0 Hf	265 5.7 Pt	273 6.0 An
237 8.4 Pt	229 5.9 Ko	241 6.0 Mg	248 6.0 Mc	265 6.0 Hf	273 5.9 Oy
237 8.6 Hf	230 5.9 Ko	241 6.0 Oy	248 5.9 Ko	265 6.0 Ko	273 5.9 L
239 8.7 Ko	230 6.0 Wa	241 6.0 Bc	248 6.0 We	265 6.1 Cy	273 5.9 Ra
240 8.9 Ah	232 6.0 Ko	241 5.8 Pt	249 6.0 Pt	265 5.9 Mc	273 5.8 Pt
240 8.4 Jo	232 5.8 Rb	241 5.9 Se	250 5.9 Pt	266 5.7 Pt	273 6.0 Lg
242 9.4 Sf	233 6.0 Mg	241 6.0 Hf	250 6.0 Mg	266 6.0 Ko	274 5.8 Ko
243 9.7 Hf	233 5.9 Se	241 6.0 Be	250 6.0 Bh	266 6.1 Cy	274 5.6 Ru
243 8.8 Mg	234 5.8 Se	241 5.9 Ad	250 6.0 L	266 6.0 Jo	274 6.0 We
244 8.8 Sg	234 5.9 Lg	242 6.1 Mg	250 6.0 Be	266 6.0 Pi	274 5.9 Mn
246 8.3 Jo	234 5.8 Jo	242 6.4 Gs	251 6.0 Jo	266 6.0 O	274 6.1 An
246 9.5 Ko	234 6.0 Mg	242 5.8 Ko	251 6.0 Mg	266 6.1 Kb	275 5.9 Ko
253 9.6 Sf	234 5.9 Ko	242 5.8 We	251 6.0 Pt	266 6.0 Pa	275 5.7 Ru
254 9.8 Ko	235 5.5 Rb	242 6.0 L	252 6.1 Sz	267 5.9 Ko	275 6.0 Be
261 10.1 Hf	235 6.0 He	242 5.9 Pt	252 6.1 Mg	267 6.1 Cy	275 5.7 Pt
263 9.9 Sf	235 6.0 Bf	242 5.9 Ra	252 6.0 Cy	267 6.0 Mc	275 5.7 Pt
267 10.0 Sh	235 6.0 Ko	242 6.0 Lg	252 6.0 Ko	267 6.0 Be	276 5.9 Ko
267 9.7 Pt	235 5.9 We	243 5.5 Rb	252 5.9 L	267 5.8 Mn	277 5.8 Ko
267 10.1 Hf	235 6.0 Bc	243 6.0 Fd	252 5.9 Ra	267 5.8 Pt	277 6.0 Jo
268 8.9 Jo	235 6.0 Ra	243 6.0 Mg	253 6.0 Oy	268 5.8 Pt	277 5.8 Mc
270 9.9 Fd	235 5.8 Se	243 5.9 Ko	253 5.9 We	268 6.1 Sh	277 5.8 Ru
271 10.8 We	236 6.0 Pa	243 6.0 L	254 5.9 L	268 5.9 Ko	277 6.1 Ah
272 9.9 Ah	236 6.0 He	243 5.9 Pt	254 6.0 Cy	268 6.1 Sz	278 5.7 Ru
290 10.6 Wd	236 6.0 Jo	243 5.8 Lg	254 6.0 Pt	268 6.0 Jo	278 6.0 We
290 10.6 Hf	236 6.0 Mg	243 6.1 An	254 6.0 Ko	269 6.0 Bc	279 5.7 Ru
299 11.5 Sf	236 6.1 Ah	244 5.5 Rb	255 6.0 Pt	269 6.0 Bf	279 5.9 Bc
U LIB	236 6.0 We	244 6.0 Pa	255 6.1 Mg	269 5.7 Pt	280 6.1 Ah
153620a	236 6.0 Bc	244 5.9 Mc	255 6.1 Lg	270 5.7 Pt	280 5.7 Ru
211[12.9 Bl	236 5.8 Pt	244 6.1 Ah	256 6.0 Pt	270 6.1 An	280 5.9 L
237[13.1 Bl	237 5.8 Pt	244 5.7 Ko	257 5.9 Pt	270 5.9 L	280 5.9 Ra
T NOR	237 6.0 Lg	244 5.9 Pt	257 5.9 Ko	270 6.2 Sg	281 5.9 L
153654	237 6.0 Jo	244 5.8 Se	257 6.0 Cy	270 6.0 Mg	281 6.0 An
196 10.3 Ht	237 5.9 Mc	244 6.0 Lg	257 6.2 An	271 6.1 Cy	281 5.9 Mn
206 10.5 En	237 6.0 Mg	244 6.1 Hf	257 5.9 Ad	271 5.7 Ru	281 5.8 Pt
208 10.5 Ht	237 5.9 Ko	245 5.9 Ko	257 6.0 L	271 6.0 We	281 5.8 Ko
211 10.6 En	237 5.8 Se	245 5.9 Mc	258 6.0 L	271 6.1 An	281 5.8 Jo
220 11.1 En	237 6.0 Hf	245 5.9 Bf	259 6.2 An	271 6.0 Be	282 6.0 Jo
220 11.8 Ht	238 6.0 Lg	245 5.9 Bc	259 6.0 Pt	271 5.9 L	282 6.1 Sz
237 12.0 En	238 5.8 Jo	245 5.9 Pt	260 6.0 Ko	271 5.8 Pt	282 6.0 Pa
248 12.6 En	238 6.0 Mg	245 5.9 Se	261 6.0 Ko	271 6.0 Bh	282 6.1 HS
266 13.1 En	238 5.9 Ko	246 5.9 Se	261 6.0 Hf	272 5.9 Ko	282 5.7 Rb
272 13.0 En	238 5.8 Pt	246 6.0 An	261 6.1 Cy	272 6.0 Cy	282 6.0 Be
Z LIB	239 5.8 Jo	246 6.0 Be	261 6.0 L	272 5.9 Mc	282 5.9 Pt
154020	239 6.0 O	246 5.9 Lg	262 6.0 L	272 6.1 Ah	283 5.9 Ko
211[12.7 Bl	239 6.0 Mg	246 5.6 Rb	262 6.0 Be	272 5.9 Bc	283 5.8 Ru
237[12.7 Bl	239 5.7 Ko	246 6.0 Jo	263 6.0 L	272 5.9 Bf	283 6.0 Bc

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
R CrB	R Ser	Z CrB	Z Sco	SX Her	SX Her
154428	154615	155229	*160021*	160325	160325
284 5.9 Ko	242 12.6 Cy	242 10.7 Mg	272 9.8 Be	216 8.0 Me	291 8.3 Hf
284 6.0 We	268 12.6 Pt	247 11.7 L	272 10.0 Ar	217 8.0 Me	293 8.4 Pt
284 6.0 Bc	267 12.8 Cy	248 9.4 We	273 9.8 L	218 8.0 Me	296 8.0 Pt
284 5.9 Pt	290[10.9 Wd	252 11.2 Cy	275 9.7 Rc	226 7.9 Ko	302 9.0 Mc
285 5.9 Pt	V CrB	253 11.5 L	275 10.2 Ar	226 8.0 L	W Sco
285 5.8 Ru	154639	257 12.6 Cy	275 9.8 Gw	234 7.9 Ko	*160519*
285 6.0 Be	226 8.8 Cy	261 12.1 L	279 10.2 Gw	236 7.9 Pt	200 11.6 Bl
285 6.0 L	234 8.2 Jo	266 12.3 El	279 10.3 Ar	237 7.9 Pt	211 11.6 Bl
286 5.9 Pt	237 7.5 Pt	272 12.8 L	279 9.5 Bl	238 7.9 Pt	228 11.7 Bl
286 5.9 Ra	238 9.0 Cy	278 13.0 El	280 10.1 Ar	239 7.9 Pt	236 12.0 Bl
287 5.8 Jo	240 8.1 Jo	281 13.1 L	281 10.0 L	239 7.9 Ko	RU Her
287 5.9 Ru	242 7.9 Gs	RZ Sco	281 10.1 Ar	241 8.2 Hf	160625
289 6.0 Wd	242 8.1 Mg	*155823*	282 9.9 Ar	243 7.9 Ko	218 13.5 Me
290 5.9 Rc	242 9.1 Hi	196 9.5 Ht	283 9.9 Ar	244 8.1 Hf	226 13.5 L
290 5.9 Hf	246 8.0 Jo	208 9.1 Ht	284 9.9 Ar	245 8.0 Ko	237 13.1 Pt
291 6.0 O	248 8.8 We	211 9.0 En	284 9.5 Wd	246 7.9 Ko	242 13.6 Mg
291 6.1 HS	251 8.0 Jo	220 8.9 Ht	291 10.1 Ar	246 7.9 An	247 13.8 L
291 6.0 Jo	251 8.5 Cy	221 8.9 En	292 10.1 Ar	247 8.0 Ko	263 13.3 L
291 6.0 Sh	258 8.4 So	237 9.2 Pt	292 9.6 Rc	247 8.0 L	267 13.1 Bw
291 6.1 Jo	265 8.7 Hi	237 9.0 En	293 10.1 Ar	248 8.0 Ko	268 13.3 Pt
292 5.9 Ru	266 8.0 Cy	240 9.1 Ht	296 10.2 Ar	250 7.9 Pt	271 13.2 L
293 6.0 Ru	268 8.1 Hf	251 9.4 En	297 10.0 Ar	251 8.1 Pt	272 10.5 Mc
293 5.9 Pt	268 7.0 Pt	252 9.4 Ht	298 10.1 Ar	252 8.0 Ko	273 13.2 Be
294 6.0 O	271 8.5 So	265 10.4 Ht	298 9.5 Rc	**253 8.1 L**	281 13.2 L
294 6.0 Hf	272 7.5 Ah	266 10.6 En	299 10.1 Ar	254 8.1 Ko	R Sco
294 5.9 Wd	273 7.5 Gs	268 10.7 Pt	300 10.0 Ar	254 8.0 Pt	*161122a*
295 5.7 Ru	277 7.5 Jo	274 10.9 En	R Her	256 8.1 Pt	196 11.3 Ht
295 5.8 Mc	277 7.7 Mc	Z Sco	160118	257 8.1 Ko	200 11.4 Bl
296 5.9 Ru	277 8.9 Hv	*160021*	257 12.3 Cy	259 8.2 Pt	207 10.7 Bm
296 5.9 Pt	278 7.8 Hi	196 11.3 Ht	263 11.5 Bw	261 8.2 Ko	208 11.1 Ht
297 5.9 Mc	279 7.7 Hi	200 10.9 Bl	268 10.0 Pt	261 8.2 L	211 10.8 En
297 5.8 Hp	280 7.9 Ah	208 10.7 Ht	271 10.3 Cy	264 8.0 Pt	211 11.5 Bl
298 5.8 Hp	281 7.5 Jo	210 10.8 Bl	275 9.9 Ko	265 8.1 Pt	216 10.8 Me
298 5.5 Rc	282 8.5 We	211 10.6 En	277 9.7 Jo	265 8.4 Ko	219 10.5 Bm
299 5.8 Hp	297 7.7 Mc	216 10.3 Me	281 9.3 Jo	265 8.2 Hf	220 10.9 Ht
299 5.8 Mc	302 8.2 Mc	220 10.9 Ht	302 9.3 Sf	266 8.6 Ko	221 11.0 En
299 6.0 O	R Lib	221 10.7 En	U Ser	266 8.1 Pt	228 11.4 Bl
302 6.0 Mc	*154715*	228 10.5 L	160210	267 8.0 Pt	237 11.7 Bl
X CrB	242[14.0 L	228 10.6 Be	244 11.0 We	268 8.2 Pt	237 11.4 En
154536	263[13.5 Bw	228 10.6 Bl	247 10.6 Hl	269 8.0 Pt	239 11.7 Pt
227 12.5 L	R Lup	236 10.6 Bl	247 11.8 Wa	270 8.0 Pt	240 11.4 Ht
242 10.6 Mg	*154736*	237 10.3 En	252 11.0 We	271 8.0 Pt	251 11.7 En
242 11.0 Hi	221 11.4 En	240 10.4 Ht	267 11.8 Cy	271 8.1 Hf	252 12.1 Ht
242 10.7 Cy	227 11.6 Sl	244 10.3 Rc	268 11.9 Pt	271 8.3 L	253 12.0 Bl
247 10.9 L	237 12.3 En	246 10.4 L	275 11.6 Cy	272 8.2 An	266 12.6 Bw
251 9.8 Cy	245 12.8 Sl	249 10.2 Rc	279 11.0 Bc	272 8.7 Mc	267 12.2 En
253 10.0 L	272 13.0 En	251 10.3 En	279 10.6 Hl	273 8.2 Pt	272 12.8 En
261 9.9 L	RR Lib	252 10.3 Ht	280 9.8 We	274 8.2 Pt	S Sco
268 9.2 Pt	*155018*	253 10.1 Bl	293 9.2 Bg	275 8.6 Ko	*161122b*
272 9.1 L	226 12.5 L	254 10.3 L	294 9.6 O	281 8.6 An	196 11.5 Ht
274 9.0 We	237 12.7 Pt	258 9.4 Bl	X Sco	281 8.1 L	200 11.4 Bl
278 9.0 Hi	246 13.3 L	262 10.0 L	*160221a*	281 8.2 Pt	207 10.8 Bm
279 9.0 Hi	263 14.0 L	263 9.8 Rc	246 14.0 L	282 8.1 Pt	208 11.0 Ht
281 8.9 L	273 14.2 L	265 10.2 Ht	254 13.3 L	284 8.4 Pt	211 11.0 En
282 9.3 We	Z CrB	266 9.8 En	263 12.6 L	284 8.2 Wd	211 11.2 Bl
302 9.0 Sf	155229	267 9.7 Rc	271 12.7 L	285 8.4 Pt	216 10.5 Me
	228 10.1 L	271 9.9 Ar	281 11.8 L	286 8.3 Pt	219 10.8 Bm
	242 10.7 Cy	272 10.3 En		289 8.3 Wd	220 10.5 Ht

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
S Sco	V Oph	SS Her	R UMi	RR Oph	SS Oph
161122b	*162112*	162807	163172	*164319*	*165202*
221 11.2 En	281 8.0 L	272 10.9 Rl	242 9.0 We	251 12.5 En	216 7.9 Cy
228 11.3 Bl	281 8.2 Jo	273 10.3 An	244 9.0 Sq	270 14.5 L	235 8.9 Jo
237 12.0 Bl	282 8.4 Ra	275 10.7 Sf	246 8.8 Jo	272 12.5 En	238 8.8 Cy
237 11.9 En	294 8.1 O	277 10.4 Jo	247 9.3 L	281 14.2 L	251 9.4 Hi
239 11.7 Pt	U Her	277 9.8 Hf	254 9.3 L	S Her	252 9.2 Cy
240 11.9 Ht	162119	278 10.2 We	261 9.4 Hf	164715	265 10.9 We
251 12.4 En	216 9.7 Me	278 10.3 El	266 9.0 L	239 11.6 Pt	271 11.9 Pt
252 12.6 Ht	226 9.5 Jo	281 11.0 Jo	267 9.3 Hf	240 12.8 Jo	271 8.9 Cy
253 12.8 Bl	234 9.3 Jo	281 10.2 L	267 9.3 Sh	242 12.0 Cy	281 9.7 Jo
266 13.2 Bw	237 9.7 Jo	282 10.8 Cy	274 9.5 Mc	257 12.4 Cy	283 8.3 Cy
267 13.0 En	239 9.5 We	283 10.7 An	281 9.6 Jo	271 12.6 Pt	RV Her
272 13.0 En	239 11.0 Pt	298 11.5 Sf	282 9.3 L	277 13.0 Jo	165631
W CrB	240 9.5 Jo	T Oph	291 9.9 Hf	281 12.5 Jo	226 12.4 L
161138	241 10.2 Hf	*162815*	302 9.8 Mc	RS Sco	235 11.5 Sg
239 8.6 Pt	242 11.0 Cy	200 9.4 Bl	R Dra	*164844*	237 11.3 Jo
240 8.7 Jo	242 10.3 Sf	211 9.7 Bl	163266	196 9.8 Ht	238 11.1 Lg
241 8.5 Hf	246 9.9 Jo	228 10.8 Bl	160 12.6 Me	200 9.3 Bl	238 11.4 Mg
244 8.8 We	250 10.4 We	237 11.1 Bl	218 12.0 Me	208 10.1 Ht	239 11.7 Pt
247 8.5 Jo	251 10.5 Hi	242 11.6 L	226 12.5 Jo	211 10.0 Cp	240 11.0 Jo
248 8.8 We	252 10.7 Cy	250 11.9 L	234 11.8 Jo	211 9.6 En	246 10.5 L
252 8.9 Sz	253 10.7 Sf	253 11.8 Bl	237 11.0 Jo	211 9.9 Bl	248 10.8 We
265 8.8 Hf	263 11.0 Sf	262 11.9 Bl	240 10.8 Jo	220 10.5 Ht	253 10.0 L
268 9.3 Sz	271 11.2 Cy	263 12.0 L	244 11.2 Ah	221 10.0 En	261 9.6 L
271 8.7 Pt	271 10.5 Pt	273 12.4 L	245 11.1 Bc	228 10.2 Bl	266 9.8 Bw
274 8.8 We	272 11.1 Mc	281 12.9 L	245 11.1 Bf	237 10.6 Bl	266 9.8 El
277 9.0 Jo	272 10.9 Ah	S Oph	245 9.6 Ra	237 10.6 En	266 9.8 Mg
282 8.6 We	277 10.8 Mc	*162816*	246 10.0 Jo	240 11.4 Ht	266 9.8 Gr
283 9.5 Hf	278 11.4 Hi	237 13.0 Bl	251 10.7 Pt	251 11.2 En	267 9.8 Lg
W Oph	282 11.4 Cy	238 13.1 Bw	261 9.1 Hf	252 11.6 Ht	271 9.8 Pt
161607	282 11.0 Jo	242 12.9 L	263 9.0 HS	253 11.3 Bl	271 10.2 We
226 13.3 L	283 11.4 Wd	242 12.9 Mg	266 9.1 El	259 11.2 Bl	272 10.1 An
246 13.7 L	289 11.6 Wd	250 12.6 L	267 9.1 Hf	265 11.9 Ht	272 9.4 L
270 14.2 L	291 11.3 Wd	253 11.7 Bl	267 9.1 Mn	267 11.4 En	273 9.8 Gr
271 13.4 Pt	Y Sco	262 10.9 Bl	267 9.1 Sh	272 11.4 En	273 9.8 Mg
V Oph	*162319*	263 10.6 L	270 8.6 Fd	279 11.7 Bl	273 9.7 Lg
162112	237[11.8 Mg	266 10.8 Bw	271 8.3 We	RR Sco	278 9.8 El
228 7.8 L	250[14.0 L	273 10.3 L	271 8.4 Pt	*165030a*	278 9.7 We
234 7.7 Jo	SS Her	279 10.0 Bl	272 8.6 Ah	196 10.6 Ht	283 10.0 An
235 7.8 Ra	162807	285 10.4 L	273 8.2 Ra	200 10.5 Bl	285 9.8 L
238 7.7 Jo	216 12.4 Me	W Her	274 8.2 Mn	209 11.0 Ht	RT Sco
239 7.5 Pt	239 10.0 We	163137	277 8.2 Wd	211 10.4 Cp	*165636*
240 7.4 Jo	239 11.0 Pt	217 11.3 Me	277 8.2 Ah	211 9.9 Bl	200 9.6 Bl
243 7.6 We	240 11.4 Jo	236 11.2 Bc	278 8.0 El	220 9.5 Ht	211 10.5 Bl
246 7.4 Jo	241 10.7 Hf	239 13.1 Pt	280 7.9 Ah	222 9.2 En	211 10.6 Cp
246 7.7 L	242 10.8 L	266 13.7 El	281 9.6 Jo	224 8.5 Sl	228 11.2 Bl
250 8.0 We	242 11.2 Cy	267 13.5 Bw	281 7.9 Mn	228 8.7 Bl	237 12.0 Bl
253 7.4 L	244 10.7 Sf	271 13.1 Pt	283 7.8 Wd	237 8.0 Bl	274[13.0 En
262 8.0 L	250 10.8 L	278 13.1 El	289 7.8 Wd	237 8.4 En	R Oph
266 8.5 Hf	250 10.5 We	279 13.2 Rl	291 7.8 Wd	240 8.4 Ht	*170215*
268 8.0 Sz	252 11.0 Cy	R UMi	291 6.9 Hf	250 7.9 Sl	228 11.5 L
268 7.8 Jo	253 10.7 Sf	163172	298 8.1 HS	251 7.9 En	234 10.2 Jo
271 7.6 Pt	258 10.4 L	152 8.9 Me	RR Oph	252 7.7 Ht	238 9.7 Jo
271 8.1 Bh	261 10.4 L	226 8.9 Jo	*164319*	253 7.5 Bl	239 9.9 Hv
273 7.6 L	263 10.7 Sf	228 9.1 L	222[12.0 En	259 6.9 Bl	240 9.7 Jo
273 8.0 Jo	266 10.7 El	234 8.8 Jo	239[12.0 Pt	265 7.1 Ht	241 9.0 We
275 7.8 Ru	271 10.3 Cy	237 8.8 Jo	242 14.3 L	267 6.9 En	244 10.5 Sq
277 8.4 Hf	271 10.1 Pt	240 8.9 Jo	250 14.4 L	272 6.7 En	244 10.5 Ra
278 8.0 We	272 10.4 L	241 9.2 Hf		279 7.0 Bl	246 10.3 L

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
R OPH	RT HER	RS HER	RU SCO	RT OPH	T HER
170215	170627	171723	*173543*	175111	180531
246 9.9 Jo	226 10.3 Jo	243 12.4 Mg	279 10.4 En	258 11.5 L	216 11.7 Me
246 10.5 O	234 11.5 Ko	246 12.3 Jo	279 11.1 Bl	266 10.7 Bw	226 12.2 L
250 9.5 We	239 11.6 Pt	268 12.4 Bw	SV SCO	271 10.2 Pt	236 12.4 Jo
254 10.1 L	240 11.8 Jo	271 12.2 Pt	*174135*	272 10.1 L	239 13.0 Pt
263 10.0 L	243 11.9 Mg	279 12.6 Hi	200 11.5 Bl	285 9.9 L	242 12.9 L
268 9.2 Jo	245 11.9 Ko	S OCT	211 10.9 Bl	T DRA	244 13.4 Cy
270 9.6 Fd	246 11.5 Sf	*172486*	228 10.5 Bl	175458a	251 13.4 L
270 10.0 Ra	266 13.0 El	206 12.6 En	237 9.9 Bl	243 11.9 Mg	263 13.5 L
271 9.4 Pt	268 12.9 Bw	209 12.6 Ht	239 10.0 En	244 12.0 Cy	268 13.2 Br
271 9.3 Ar	271 13.1 Pt	211 12.5 Bl	251 9.8 En	253 12.0 L	270 13.1 El
272 9.2 Ar	279 13.2 Hi	220 12.1 En	254 9.4 Bl	266 12.1 L	271 12.9 Pt
272 9.2 Mc	280 13.1 El	220 12.3 Ht	259 9.2 Bl	270 12.2 El	272 12.9 L
272 8.8 We	RW SCO	228 11.1 Bl	267 9.6 En	271 12.0 Cy	275 12.5 El
272 9.3 An	*170833*	236 9.6 En	274 9.6 En	280 12.4 El	278 11.4 We
273 9.0 Gs	211[12.6 Cp	236 10.3 Ht	279 9.8 En	283 12.3 Cy	280 12.0 Br
273 8.9 Jo	*222*[12.5 En	237 9.8 Bl	279 9.7 Bl	285 12.4 L	284 11.1 Cy
273 8.8 Hf	237[13.0 Bl	241 9.6 Ht	W PAV	UY DRA	285 11.7 L
273 9.3 L	251[12.5 En	248 9.0 En	*174162*	175458b	295 8.0 Ru
275 9.3 Ar	267[12.5 En	252 8.4 Ht	211[13.0 Bl	243 11.2 Mg	296 8.0 Ru
275 9.4 Gw	279[12.5 En	253 8.1 Bl	220[13.0 Ht	244 10.9 Cy	W DRA
277 9.5 Mc	Z OPH	254 8.7 Sl	236[13.0 Ht	253 10.8 L	180565
277 8.9 Hv	171401	259 7.5 Bl	251[13.0 En	266 10.8 L	242 13.1 L
279 8.5 Gw	235 8.3 Jo	265 8.1 En	267[13.0 En	270 10.6 El	253 13.8 L
279 8.1 Hl	236 8.5 Ah	271 8.3 En	282[13.0 Ht	271 10.7 Cy	266 14.1 L
279 8.5 Ar	238 7.8 Cy	276 8.4 En	RS OPH	280 10.7 El	268 14.2 Br
280 8.3 Ar	239 8.2 Pt	279 8.2 Bl	*174406*	283 10.8 Cy	285 14.3 L
281 8.2 Jo	240 8.3 Jo	282 8.4 Ht	239 11.1 Pt	285 10.9 L	X DRA
281 8.5 An	240 8.3 Ah	RU OPH	271 11.0 Pt	RY HER	180666
281 8.4 L	241 8.6 We	172809	300 6.4 Pt	175519	242 12.9 L
281 8.2 Ar	241 8.2 Hf	239 12.2 Pt	301 6.5 C	239 9.8 Pt	251[11.2 Pt
282 7.9 Ar	243 8.3 Mg	240 11.8 Jo	307 7.4 C	242 9.8 L	253 13.3 L
282 8.0 HS	244 8.4 Ah	242 12.1 L	307 7.5 Mz	251 9.2 L	266 13.9 L
283 7.7 Ar	246 8.1 Jo	243 12.1 Mg	307 7.5 Cu	261 8.9 L	271[11.4 Pt
284 7.6 Ar	250 **8.0 We**	246 11.5 Jo	309 7.8 C	271 9.2 Pt	TV HER
284 7.8 Gw	252 8.3 Cy	247 11.5 Wa	310 7.8 C	272 9.0 L	181031
284 8.3 Wd	265 8.3 Hf	250 11.6 L	311 7.9 C	285 9.5 L	242 12.6 L
291 7.5 HS	271 8.4 Cy	261 10.0 L	312 8.0 C	V DRA	251 10.9 L
291 8.1 Wd	271 8.2 Pt	271 9.4 Pt	314 8.2 C	175654	261 10.7 L
291 8.1 Hf	*272* 8.6 Ah	*272* 9.2 L	U ARA	242 11.5 L	272 10.2 L
291 7.7 Bo	*272* 8.1 We	*272* 9.9 An	*174551*	251 12.7 L	285 10.0 L
291 7.8 Ar	273 8.2 Gs	277 9.4 Jo	196 10.7 Ht	266 12.7 L	RY OPH
292 7.8 Ar	273 8.2 Hf	283 9.3 An	209 8.7 Ht	271 13.0 Pt	181103
292 7.6 Rc	273 8.4 Wa	285 8.7 L	220 8.3 Ht	285 13.7 L	238 12.4 Bw
292 7.4 Sq	275 8.3 Wa	RT SER	222 8.4 En	R PAV	239 12.7 Pt
293 7.6 Ar	277 8.0 Jo	*173411*	236 8.4 Ht	*180363*	241 11.2 We
294 7.5 O	279 **8.0 Hl**	242 12.9 L	239 8.3 En	220 12.6 Ht	244 12.3 Cy
295 8.7 Mc	280 8.7 Ah	270 13.0 L	241 8.4 Ht	221 11.8 En	268 9.4 Br
295 7.7 Ru	281 8.2 Ra	RU SCO	251 8.6 En	222 11.6 En	271 9.8 Pt
296 7.6 Ar	282 8.0 Cy	*173543*	252 8.5 Ht	236 11.6 Ht	272 9.2 We
296 7.7 Ru	291 8.2 Wd	211 12.8 Bl	267 9.6 En	239 11.2 En	272 9.7 Ah
297 7.6 Ar	291 8.3 Hf	222 12.0 En	*272* 8.9 En	241 11.3 Ht	273 9.5 Cy
298 7.6 Ar	RS HER	237 11.5 Bl	279 10.1 En	251 10.9 En	278 8.8 We
299 7.6 Ar	171723	239 11.5 En	282 10.5 Ht	252 10.3 Ht	280 9.2 Ah
300 7.7 Ar	226 11.4 Jo	251 11.1 En	RT OPH	267 8.9 En	282 8.9 HS
300 7.6 Gw	234 11.6 Jo	253 11.0 Bl	175111	*272* 8.7 En	284 8.1 Hf
303 8.2 Mc	239 12.5 Pt	259 11.0 Bl	242 13.3 L	279 8.3 En	290 8.1 Hf
	240 12.0 Jo	267 10.9 En	243 12.8 Bw	282 8.0 Ht	
	242 12.3 Cy	274 10.9 En	250 12.3 L		

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J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.	J.D.Est.	Obs.
RY OPH		T SER		X OPH		R SCT		R SCT		R SCT	
181103		182306		183308		*184205*		*184205*		*184205*	
290	7.9 Wd	267	13.2 Bw	279	7.5 We	239	5.2 Jo	247	5.2 Jo	265	5.4 Mc
291	8.2 HS	268	13.2 Br	281	8.4 Mn	239	5.7 Se	247	5.4 Pt	265	5.4 Ra
298	8.3 Mc	271	12.5 Pt	281	8.5 L	239	5.8 Mc	247	5.2 Hf	265	5.9 GD
303	8.3 Mc	280	13.2 Br	291	8.7 HS	239	5.6 Mg	248	5.5 Mc	266	5.9 GD
W LYR		283	13.2 Wa	292	8.3 Rc	240	5.7 Mg	248	5.3 Ko	266	5.4 Pt
181136		SV DRA		RY LYR		240	5.8 Lg	248	5.0 We	266	5.5 Hf
226	11.4 Jo	183149		184134		240	5.0 Jo	249	5.3 Pt	266	5.1 Ko
236	12.0 Jo	266	14.2 L	247	14.4 L	240	5.8 Bc	250	5.5 Pt	266	5.0 Jo
239	12.1 Pt	268	14.5 Br	266	14.1 L	240	5.9 Bf	250	5.4 Mg	266	5.0 Pi
242	12.2 L	280	13.8 Br	285	14.3 L	240	5.3 Ra	250	5.0 L	266	5.7 Bc
243	11.0 We	285	13.8 L	R SCT		240	5.0 Cy	250	5.0 Sl	266	5.1 HS
244	12.2 Cy	RZ HER		*184205*		241	5.7 Lg	251	5.2 Jo	267	5.3 Ko
246	12.5 Jo	183225		216	6.4 Cy	241	5.6 Mg	251	5.5 Mg	267	5.5 Pt
251	12.0 L	253	13.3 L	216	6.7 Me	241	6.0 We	241	5.5 Bc	267	5.5 Mc
263	12.4 L	267	13.4 Bw	217	6.4 Me	241	5.1 Bc	251	5.5 Bf	267	5.7 Mn
265	12.1 So	272	13.3 L	218	6.4 Me	241	5.2 L	251	5.3 Pt	268	5.3 Ko
270	12.0 So	280	13.4 Br	218	6.2 Cy	241	5.7 Pt	252	4.9 Cy	268	5.0 Jo
271	12.0 Pt	X OPH		226	5.9 Cy	241	5.6 Se	252	5.5 Mg	268	5.6 Hf
272	11.7 L	183308		226	5.8 Jo	241	5.5 Hf	252	5.2 Ko	268	5.9 GD
272	12.0 Cy	226	7.9 Jo	226	5.9 Ko	241	5.2 Ad	252	4.7 We	268	5.5 Pt
273	11.5 Ah	226	7.8 L	226	6.0 L	242	5.7 Mg	252	5.5 Bf	269	5.5 Pt
280	11.5 Rl	234	8.2 Jo	228	5.9 Sl	242	5.4 Oy	252	5.5 Bc	269	5.8 Bc
281	12.0 So	235	8.0 We	232	5.3 Cy	242	5.3 Ko	253	5.5 Mg	269	5.9 GD
283	10.8 Rl	235	7.9 Ra	234	5.3 Cy	242	5.1 Bc	253	5.1 Oy	270	5.9 GD
283	11.1 Wd	237	7.9 Ko	234	5.8 Mg	242	5.6 Pt	253	4.8 We	270	5.9 An
284	10.9 Cy	237	8.4 Jo	234	5.9 Lg	242	5.2 Ra	253	4.9 Ra	270	5.6 Pt
285	10.9 L	238	8.3 Cy	234	6.5 GD	242	5.3 Hf	254	5.1 Pt	270	5.7 Ra
290	10.3 Wd	239	8.4 Pt	234	5.6 Jo	242	5.8 Lg	254	5.1 Cy	270	6.0 Ar
290	10.4 Hf	240	8.2 Jo	234	5.6 Se	243	5.8 Lg	254	5.2 Ko	271	5.7 Ar
RV SGR		241	7.8 Ad	235	5.5 Jo	243	5.5 Fd	254	4.9 Sl	271	5.7 Pt
182133		242	8.4 Cy	235	6.1 Mc	243	5.5 Mg	255	5.4 Lg	271	5.3 Cy
200	12.4 Bl	242	8.0 Ra	235	5.9 Bc	243	5.5 Pt	255	5.4 Mg	271	4.9 Jo
211	13.0 Bl	246	8.2 L	235	5.8 Ra	243	5.0 Be	255	5.1 Pt	271	5.5 We
237	13.8 Bl	247	8.3 Jo	235	5.8 We	244	5.1 Cy	256	5.0 Pt	271	5.5 Bc
279	12.4 En	247	8.1 Ko	235	5.8 Bf	244	5.0 Mc	257	5.0 Pt	271	5.5 Bf
SV HER		248	8.1 Cy	236	5.5 He	244	5.4 Ko	257	5.1 Ko	271	6.0 An
182224		250	8.0 We	236	5.8 Bc	244	5.5 Pt	257	5.1 Cy	271	5.3 Be
235	9.3 Jo	252	8.0 We	236	5.7 Pt	244	5.1 Ra	257	5.5 Bc	271	5.9 GD
239	9.0 Pt	252	8.0 Ra	236	5.8 Bf	244	5.6 Se	257	5.9 An	272	5.8 Mc
240	9.2 Jo	253	8.6 Oy	236	5.7 Mg	244	5.8 Lg	257	5.2 Ad	272	5.5 Bc
242	9.4 L	253	8.2 L	237	5.8 Lg	245	5.2 Mc	259	5.0 Pt	272	5.5 Bf
247	9.7 O	257	8.2 Cy	237	5.4 Sl	245	5.1 Ko	259	5.5 Bc	272	6.1 An
247	9.3 Jo	257	7.9 Ad	237	5.8 Mc	245	5.5 Bc	259	5.9 An	272	5.8 Ar
250	9.3 L	263	8.4 L	237	5.5 Jo	245	5.5 Bf	260	5.0 Ko	272	5.4 L
261	9.8 L	265	8.7 HS	237	5.7 Mg	245	5.5 Pt	261	5.1 Ko	273	5.6 Ko
270	10.8 El	265	8.6 Ko	237	5.4 Ko	245	5.5 Se	261	5.0 L	273	5.7 Mg
271	10.8 Pt	266	8.8 HS	237	5.8 Bc	246	5.4 Se	261	5.3 Cy	273	4.9 Jo
274	11.1 Br	267	8.2 Cy	237	6.0 GD	246	5.2 Hf	263	5.0 Pi	273	5.8 Lg
275	11.1 El	267	8.3 Mn	237	5.9 Pt	246	5.0 Be	263	5.0 Jo	273	5.8 Gr
277	10.5 L	270	8.3 Ra	237	5.6 Se	246	5.0 Cy	263	5.5 HS	273	5.9 Ra
285	11.5 L	271	8.6 Pt	238	5.2 Cy	246	5.4 Jo	263	5.2 Ra	273	5.8 Hf
T SER		271	8.6 Jo	238	5.9 Lg	246	5.3 O	264	5.2 Pt	273	5.9 An
182306		271	8.0 We	238	5.4 Jo	246	5.3 Ko	264	5.8 An	273	5.4 Oy
226	10.5 Jo	272	8.5 L	238	5.7 Mc	246	5.5 Bc	265	5.2 Be	273	5.9 Pt
234	11.1 Jo	273	8.5 Oy	238	5.7 Mg	246	5.5 Pt	265	5.4 Pt	274	5.9 Pt
237	11.5 Jo	274	8.4 Mn	238	5.9 Pt	246	5.1 Sl	265	5.4 Hf	274	5.7 Ko
239	11.3 Pt			238	6.0 GD	246	5.9 Lg	265	5.2 Ko	274	5.9 Mc
240	11.8 Jo			239	5.6 Ra	247	5.8 Lg	265	5.1 Cy	274	5.0 We

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J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs. J.D.Est.Obs.

R Sct
184205
274 5.9 Mn
274 6.1 An
275 5.6 Ko
275 5.3 Cy
275 5.8 Bc
275 5.8 Bf
275 5.5 Wa
275 5.8 Pt
276 5.8 Bc
276 5.8 Bf
277 5.8 Bc
277 5.9 Bf
277 5.8 Ko
277 5.2 Jo
277 6.0 Mc
277 5.8 Hf
278 5.8 Bc
278 5.6 GD
279 5.4 Be
279 5.9 Bc
279 6.1 Rc
280 5.8 We
280 6.1 An
280 6.0 Ra
281 5.8 Ko
281 5.0 Jo
281 5.9 Hf
281 6.1 An
281 6.2 GD
281 5.9 Mn
281 5.8 L
281 5.9 Pt
281 5.4 Rc
282 6.0 GD
282 5.9 Pt
282 5.8 Cy
282 5.8 Pa
282 5.0 Jo
282 5.8 HS
283 6.1 An
283 5.8 Ko
283 5.6 Cy
283 5.8 Bc
283 6.0 GD
283 5.9 Wd
284 5.9 Wd
284 5.6 Pt
284 5.8 Ko
284 5.8 Cy
284 5.7 Gw
284 6.0 We
284 5.9 Hf
284 5.9 Bc
285 6.2 An
285 5.6 Pt
286 6.0 Ra
286 5.5 Pt
288 6.4 GD

R Sct
184205
289 6.1 GD
289 5.9 Wd
290 6.1 GD
290 6.0 Rc
290 6.0 Hf
291 5.7 HS
291 5.9 Wd
291 6.1 Sh
291 5.6 Jo
291 5.5 Jo
291 5.5 Sq
292 6.1 Hf
293 5.8 Gw
293 6.1 GD
293 6.1 Pt
294 6.0 Wd
294 6.5 O
294 6.0 Hf
295 6.3 Mc
296 5.9 Pt
297 6.1 Mc
297 5.5 Hv
298 6.1 Mc
298 6.0 Rc
299 6.2 Mc
300 5.8 Gw
302 6.3 Mc
303 6.5 Mc
RW Lyr
184243
276[14.2 Br
283[14.2 Br
Nov Aql
184300
216 11.2 Cy
234 11.5 Jo
236 11.4 Pt
240 11.0 Jo
244 10.5 Cy
250 11.4 Pt
264 11.4 Pt
267 11.2 Cy
271 11.5 Pt
277 11.2 Cy
286 11.6 Pt
RX Lyr
185032
242 12.4 L
250 12.5 L
251 12.7 Pt
263 12.8 L
270 13.1 Ar
271 13.3 Br
272 13.2 L
272 13.2 Ar
275 13.3 Ar
275 13.4 Gw
278 13.3 Ar

RX Lyr
185032
279 13.3 Ar
280 13.5 Ar
281 13.7 Ar
282 13.6 Ar
283 13.7 Ar
284 13.7 Ar
285 14.1 L
289[13.5 Ar
291[13.5 Ar
297[13.5 Ar
300[13.0 Gw
S CrA
185437a
209 11.7 Ht
210 12.0 Sl
211 11.6 Bl
220 11.7 Ht
227 11.5 Sl
228 11.4 Bl
236 12.1 Sl
237 11.6 Bl
239 11.6 En
240 11.5 Ht
246 11.3 Sl
250 11.3 Sl
252 11.1 Ht
252 11.1 En
254 11.5 Bl
254 12.1 Sl
259 11.5 Bl
265 11.8 Ht
268 11.9 En
279 12.0 En
279 11.7 Bl
281 11.6 Ht
ST Sgr
185512a
250[14.0 L
266[14.0 L
R CrA
185537a
209 11.4 Ht
210 11.3 Sl
211 11.5 Bl
220 11.6 Ht
227 11.3 Sl
228 11.3 Bl
236 10.9 Sl
237 11.3 Bl
238 11.3 Bl
239 10.9 En
240 10.5 Ht
246 11.1 Sl
250 11.4 Sl
252 11.3 Ht
252 11.5 En
254 11.3 Bl
254 11.3 Sl

R CrA
185537a
259 12.2 Bl
265 11.2 Ht
268 11.7 En
279 12.0 En
279 11.7 Bl
281 11.3 Ht
T CrA
185537b
210 13.3 Sl
211 12.9 Bl
227 13.0 Sl
236 13.0 Sl
238 13.0 Bl
239 12.8 En
240 12.5 Ht
246 13.3 Sl
250 13.3 Sl
254 13.3 Sl
265 12.5 Ht
268 13.0 En
Z Lyr
185634
246[14.0 L
251[12.3 Pt
266[14.5 L
276[14.5 Br
285 14.4 L
SU Sgr
185722
209 8.9 Ht
220 8.6 Ht
240 8.7 Ht
252 8.6 Ht
265 8.5 Ht
281 8.6 Ht
RT Lyr
185837
242 10.6 L
253 10.8 L
263 10.9 L
270 11.6 El
271 11.7 Br
272 11.4 L
275 11.5 El
285 12.3 L
V Aql
185905
267 7.9 Mn
274 7.9 Mn
281 7.9 Mn
R Aql
190108
214 7.2 Cy
226 7.0 Jo
227 6.4 Ah
228 6.4 Ah
230 6.4 Ah
234 6.1 Se

R Aql
190108
235 6.4 Ra
235 7.2 We
235 6.7 Jo
236 6.9 Jo
236 6.3 Ah
237 6.0 Ko
237 6.1 Se
238 6.5 Cy
239 6.7 Jo
240 6.6 Ah
241 6.1 Se
242 6.4 Oy
244 6.6 Ah
246 6.1 Se
246 7.1 Jo
247 6.3 Ko
248 6.3 Cy
251 6.2 Pt
252 7.0 We
253 7.0 Oy
257 7.0 Cy
257 6.9 Ad
263 7.4 Ra
265 6.8 Ko
265 7.5 Ra
266 7.5 HS
267 7.0 Mn
272 7.6 Ah
273 7.0 We
273 6.0 Gs
273 7.6 Cy
273 7.5 Jo
273 7.5 Oy
274 7.4 Mn
274 7.2 Pt
275 7.6 Ra
277 7.7 Ah
279 7.5 We
280 7.7 Ah
280 7.7 Ra
281 7.6 Mn
281 8.3 So
284 7.9 Cy
292 7.4 Rc
V Lyr
190529a
271 10.3 Br
274 9.7 Pt
RX Sgr
190818
209[12.4 Ht
221[13.1 L
240[12.7 Ht
251[12.4 Pt
265[12.7 Ht
274[12.4 Pt
281[12.4 En

RW Sgr
190819a
209 9.6 Ht
216 9.4 Cy
220 9.6 Ht
240 9.4 Ht
241 9.4 L
244 9.5 Cy
250 9.6 We
251 9.4 Pt
252 9.3 L
252 9.6 Ht
263 9.5 L
265 9.7 Ht
268 9.8 En
272 9.7 L
273 9.8 Cy
274 9.5 Pt
281 10.2 En
281 9.9 Ht
285 10.0 L
TY Aql
190907
216 10.7 Me
251 10.6 Pt
265 10.9 So
268 10.9 Bw
273 10.4 Cy
274 10.4 Pt
281 11.0 So
284 10.7 Cy
S Lyr
190925
242 12.5 L
253 12.6 L
266 13.4 L
267 13.4 Bw
271 13.6 Br
282 13.5 L
X Lyr
190926
251 8.9 Pt
274 8.7 Pt
RS Lyr
190933a
242 13.2 L
251 12.5 Pt
252 13.1 L
266 12.3 L
271 12.5 Br
274 12.3 Pt
282 12.1 L
RU Lyr
190941
251 10.2 Pt
274[12.7 Pt
283[13.8 Br
U Dra
190967
238 9.5 Jo

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1933.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
U DRA	R SGR	RY SGR	S SGR	RT AQL	RT CYG
190967	*191019*	*191033*	*191319a*	193311	194048
240 9.5 Jo	268 7.8 Jo	252 10.4 L	282 12.5 L	246 10.2 L	246 10.0 Ko
242 10.0 We	268 7.6 En	252 9.4 Bl	Z SGR	253 10.4 L	246 10.0 Jo
242 9.9 L	270 7.9 El	252 9.2 Ht	*191321*	266 10.9 L	248 9.8 Hf
244 10.6 Ra	272 8.3 L	253 10.3 L	248[13.3 L	271 11.0 Br	251 9.1 O
246 9.8 Jo	274 7.8 Pt	254 10.0 Pt	268[12.4 En	272 10.8 Ah	253 8.8 Oy
251 10.0 Pt	275 8.1 We	254 10.0 En	SW SGR	272 11.2 Cy	253 8.8 We
252 10.1 L	278 7.7 Ru	254 9.6 Bl	*191331*	274 11.3 Pt	257 8.8 Ko
266 10.8 L	279 7.8 Ru	254 10.1 Sl	211[12.9 Bl	282 11.5 L	261 8.7 Hf
268 11.0 Br	280 7.8 Ru	256 10.2 Pt	238[12.9 Bl	284 11.3 Cy	265 8.4 Ko
271 10.8 We	281 8.2 Hf	258 10.2 L	268 12.6 En	R CYG	266 8.0 Jo
273 11.0 An	282 8.9 We	259 9.3 Bl	TZ CYG	193449	267 8.5 Hf
273 11.7 Ra	282 8.0 Ru	262 9.5 Bl	191350	216 12.0 Me	267 8.4 Sh
274 10.9 Pt	282 8.4 Ra	263 10.5 L	240 9.4 Jo	238 12.8 Pt	268 8.1 Jo
285 11.5 L	285 8.2 L	264 10.2 Pt	247 9.5 Jo	270 13.1 El	270 8.1 El
W AQL	287 8.2 En	265 10.4 Pt	251 9.9 Pt	274 13.3 Bh	272 8.1 Ah
191007	291 8.6 Sh	265 9.5 Ht	274 9.5 Pt	275 13.1 El	273 7.8 Hf
242 12.7 L	292 8.2 Hf	266 10.6 Pt	U LYR	275 13.0 Pt	274 7.6 Ko
251 11.8 L	RY SGR	266 10.4 L	191637	RV AQL	275 7.3 El
251 12.0 Pt	*191033*	267 9.2 En	217 12.4 Me	193509	275 7.9 Pt
263 10.9 L	199 10.7 Cp	268 9.2 En	218 12.0 Cy	228 13.9 L	276 7.8 Oy
265 10.7 So	200 10.6 Bl	268 10.5 Pt	236 12.0 Jo	246 13.8 L	281 6.7 Ra
268 10.3 Bw	209 10.9 Ht	269 10.1 Pt	245 12.9 Cy	254 13.7 L	283 7.3 Wd
272 9.8 L	211 11.0 Cp	270 10.0 Pt	247 12.4 Jo	266 13.1 L	284 8.1 Rl
273 9.6 Cy	211 10.9 Bl	270 10.1 L	251 12.2 Jo	271 12.5 Br	286 6.6 Ra
274 9.5 Pt	216 11.2 Cp	271 10.0 Pt	251 12.0 Pt	275 12.7 Pt	291 7.4 Wd
281 9.1 So	216 11.2 Me	272 9.9 L	272 12.7 Cy	282 11.9 L	291 7.9 Sh
284 9.0 Cy	217 11.0 Me	272 9.1 En	274 12.7 Pt	283 12.0 Br	292 7.8 Hf
285 8.4 L	218 11.1 Me	273 9.5 Pt	284 12.5 Cy	T PAV	294 7.4 Hv
T SGR	220 11.0 Ht	274 9.5 Pt	AF CYG	*192072*	302 8.2 Mc
191017	220 11.1 En	274 8.8 En	192745	196 9.0 Ht	TU CYG
238 10.5 Jo	222 11.0 En	276 8.7 En	227 6.7 Ah	200 8.5 Bl	194348
243 10.8 Fd	222 10.5 Cp	278 8.9 Bl	228 6.6 Ah	209 8.4 Ht	216 9.8 Me
251 11.2 Pt	223 11.0 En	279 8.6 En	230 6.4 Ah	211 8.1 Bl	226 9.2 Jo
274 11.2 Pt	226 10.9 L	281 9.4 L	234 7.0 Se	220 8.2 Ht	226 9.8 Ry
R SGR	227 11.3 Sl	281 8.5 Pt	236 6.2 Ah	228 8.1 Bl	228 9.8 L
191019	228 11.2 L	281 8.8 Ht	237 7.0 Se	236 8.5 Ht	229 10.0 Ry
209 8.0 Ht	228 11.0 Bl	282 8.5 Pt	240 6.0 Ah	237 8.3 Bl	234 9.6 Jo
216 8.1 Me	236 10.3 Ht	282 9.3 L	241 7.0 Se	241 8.6 Ht	237 10.0 Jo
220 8.0 Ht	237 10.3 Sl	283 8.5 En	244 6.9 Se	252 9.2 Ht	238 10.6 Pt
237 7.4 Ko	237 10.1 Bl	284 9.2 L	244 6.2 Ah	254 9.0 Bl	238 10.8 Ry
237 7.1 Bc	238 9.7 Bl	296 8.5 Pt	247 7.0 Se	259 9.1 Bl	240 10.5 Jo
237 7.3 Ra	238 11.2 Pt	TY SGR	272 6.8 Ah	268 10.5 En	243 11.0 Fd
238 7.5 Jo	239 10.6 En	*191124*	274 7.0 Ah	279 11.3 Bl	246 10.6 Jo
239 7.6 En	240 10.6 En	211[13.0 Bl	TY CYG	281 12.1 En	246 11.1 L
240 7.3 Ht	240 10.3 Ht	238[12.4 Bl	192928	282 11.4 Ht	249 11.6 Ry
241 7.6 Hf	241 10.4 L	S SGR	226 12.3 L	RT CYG	253 10.2 We
242 7.3 L	242 10.4 L	*191319a*	246 12.7 L	194048	254 11.7 Ry
250 7.4 We	243 10.4 L	209[12.7 Ht	254 13.0 L	216 12.0 Me	254 11.6 L
251 7.1 L	243 10.6 En	211[13.1 Bl	266 13.9 L	226 12.0 Jo	258 12.1 Ry
251 6.7 Pt	243 9.8 Bl	220[12.7 Ht	271 13.4 Br	234 10.0 Jo	266 12.4 Ry
252 7.1 En	246 9.9 Sl	240[12.7 Ht	274[12.7 Pt	237 10.3 Jo	266 12.7 L
252 7.5 Ht	248 10.5 L	248[13.5 L	283 14.0 Br	238 9.9 Pt	268 11.0 Jo
254 7.3 Ko	250 10.3 L	251 13.3 Pt	RT AQL	239 10.5 Ko	268 12.4 Ry
257 7.2 Ad	250 9.8 Pt	266 13.4 L	193311	240 10.0 Jo	273 12.8 Ry
263 7.8 L	250 9.8 Sl	268 12.9 En	227 8.8 L	241 9.5 Oy	274 13.0 Br
263 8.2 Ra	251 10.3 L	274[12.7 Pt	240 9.9 Ah	241 9.9 Hf	275 12.8 Pt
265 8.0 Ht	251 9.6 En	281 12.0 Ht	244 10.0 Ah	244 8.5 We	277 13.1 Ry
266 7.7 Hf	252 9.6 En		245 9.9 Cy	244 9.8 Ah	282 13.6 L

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
TU CYG	RU SGR	SY AQL	RW AQL	RS CYG	R DEL
194348	*195142*	200212	*200715b*	200938	201008
283 13.5 Br	228 7.3 Bl	248 14.5 L	281 9.3 Pt	239 7.6 Fn	243 8.6 L
X AQL	237 7.1 Bl	274 14.0 Br	282 9.2 Bg	240 7.2 Jo	244 8.5 We
194604	240 7.2 Ht	282 13.8 L	R TEL	241 7.9 Hf	244 9.2 Ah
228 11.8 L	251 7.6 En	283 14.0 Br	*200747*	241 7.6 Ad	246 8.7 Jo
234 12.0 Jo	252 7.2 Ht	S CYG	211[13.5 Bl	242 7.5 Oy	246 9.0 Sf
237 11.7 Jo	254 7.2 Bl	200357	238[13.5 Bl	244 8.2 We	248 8.8 Cy
238 11.2 Pt	259 7.2 Bl	242 13.0 Wr	269 12.0 En	245 7.8 Cy	252 8.8 L
242 11.0 Sf	265 7.5 Ht	270 12.5 El	RU AQL	246 7.3 Jo	261 9.6 Ko
243 11.0 O	268 7.6 En	274 12.6 Br	200812	246 7.4 L	261 9.5 L
246 11.0 L	281 7.8 En	275 13.0 El	243 14.1 L	247 8.0 O	263 9.8 Sf
247 10.2 Jo	281 7.8 Ht	275 12.1 Pt	252 14.3 L	248 8.0 Hf	265 8.5 Hf
252 10.4 We	RR AQL	283 12.0 Br	269 14.0 L	248 7.2 Be	270 10.2 El
253 10.7 L	*195202*	303 11.3 Mc	274 13.4 Br	252 7.9 Cy	271 10.2 We
257 9.9 Sf	242 11.7 L	R CAP	282 13.7 L	253 7.2 Oy	271 10.4 Cy
261 9.4 L	245 11.5 Cy	*200514*	283 13.0 Br	253 8.0 We	272 10.2 Ah
263 9.4 Sf	251 11.7 L	228 13.6 L	W CAP	253 7.6 Fn	272 10.7 L
271 8.8 Br	266 12.3 L	238 13.2 Pt	*200822*	254 7.4 L	274 10.5 Br
272 9.3 Mc	271 12.0 Br	247 10.6 Jo	211 11.5 Bl	254 7.4 Ko	275 10.5 Sf
272 8.9 L	273 12.0 Cy	248 13.2 L	228 11.4 Bl	257 7.9 Cy	277 9.6 Mc
272 8.9 Ah	282 12.1 L	266 12.3 L	228 11.6 L	257 7.7 Ad	277 10.9 Bg
273 9.2 Jo	284 12.0 Cy	281 11.4 Jo	237 11.5 Bl	260 7.8 Hf	281 10.8 Pt
273 8.8 We	RS AQL	281 11.8 Pt	238 12.5 Pt	260 7.6 Sh	282 8.8 Hf
275 8.7 Sf	*195308*	282 11.4 L	248 12.0 L	265 7.8 Hf	282 11.2 Cy
275 8.5 Pt	248[13.8 L	S AQL	254 12.6 Bl	265 7.5 Ko	284 11.2 L
277 9.1 Mc	NOV CYG	200715a	266 13.0 L	265 8.2 HS	298 9.1 Mc
279 8.8 We	195553	216 11.4 Me	284 13.9 L	266 7.9 Cy	RT CAP
280 8.6 Ah	236[12.2 Pt	235 11.0 We	Z AQL	267 7.4 Be	*201121*
281 9.2 Jo	264[12.2 Pt	238 11.5 Pt	*200906*	267 7.3 L	281 6.6 Pt
283 8.8 Hf	275[12.2 Pt	240 11.0 Jo	238 13.1 Pt	268 7.3 Jo	SX CYG
284 8.7 L	296[12.2 Pt	243 10.8 Fd	277 10.3 Bg	270 7.2 Sg	201130
298 9.2 Mc	RR TEL	246 10.2 An	281 10.3 Pt	270 7.5 Fn	214 8.5 Cy
298 9.0 Sf	*195656*	246 11.0 Jo	R SGE	271 8.2 Cy	234 8.4 Cy
X CYG	220[12.6 Ht	248 10.7 Cy	200916	273 7.4 Oy	238 8.8 Jo
194632	252[12.6 Ht	252 10.8 We	216 8.9 Me	273 7.5 Ra	242 8.5 Cy
214 13.2 Cy	269[12.6 En	268 9.4 Jo	237 8.8 Jo	273 7.4 Jo	252 8.5 Cy
238 13.5 Pt	281[12.6 Ht	272 9.5 Cy	240 8.8 Jo	274 7.2 Ko	253 9.5 We
248 13.2 Cy	Z CYG	273 9.6 We	246 8.9 Jo	275 7.4 We	264 8.5 Pt
270 13.6 El	195849	273 9.2 Jo	246 8.7 An	277 8.1 Wd	267 8.9 Cy
274 13.3 Br	217 12.3 Me	279 9.6 We	268 9.0 Jo	277 7.9 Hf	268 8.8 Bw
275 13.5 El	228 11.1 L	281 9.5 Pt	272 8.7 An	277 7.4 Jo	274 9.2 Cy
275 13.3 Pt	238 11.3 Pt	282 9.1 Bg	273 8.8 Jo	281 7.0 Pt	276 9.1 Br
283 13.3 Br	246 11.7 L	282 9.5 Cy	285 8.6 An	282 7.6 L	281 8.9 Pt
284 12.5 Wd	254 12.5 L	285 9.5 An	RS CYG	282 7.2 Fn	RT SGR
298 7.6 HS	267 12.9 L	RW AQL	200938	283 8.0 Wd	*201130*
S PAV	274 13.0 Br	*200715b*	210 7.8 Cy	289 8.1 Wd	211 11.1 Bl
194659	275 12.8 Pt	236 9.6 Jo	214 7.8 Cy	291 8.0 Wd	228 11.7 Bl
269 7.0 En	282 13.0 L	238 9.3 Pt	226 7.4 Cy	291 7.8 Sh	237 12.0 Bl
RR SGR	283 13.2 Br	240 9.3 Jo	226 7.3 Jo	292 8.2 Hf	269 12.7 En
194929	S TEL	246 9.6 Jo	226 7.3 L	296 8.3 HS	WX CYG
211 11.7 Bl	*195855*	248 9.6 Cy	227 7.5 Fn	R DEL	201437b
228 11.9 Bl	211 13.0 Bl	252 9.2 We	232 7.3 Cy	201008	210 11.8 Cy
237 12.0 Bl	238 13.0 Bl	268 9.5 Jo	234 7.4 Jo	214 8.6 Cy	217 11.8 Me
251 12.6 En	240 12.7 Ht	272 9.2 Cy	236 7.1 He	237 8.6 Jo	226 11.9 Jo
267 13.0 En	252 12.6 Ht	273 9.4 Jo	236 7.8 Ra	237 8.6 Ko	226 11.4 L
RU SGR	265 12.8 Ht	279 8.5 We	237 7.3 Jo	238 8.9 Pt	226 11.5 Cy
195142	269 13.0 En		237 7.3 Ko	240 8.5 Jo	234 11.9 Cy
211 8.6 Bl	281 12.8 Ht		238 7.6 Cy	241 8.5 We	234 11.7 Jo
220 7.7 Ht			238 7.1 Pt	242 8.7 Hf	

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
WX CYG	U CYG	U CYG	Y DEL	W AQR	R VUL
201437b	201647	201637	203611	*204101*	205923a
237 11.7 Jo	241 7.3 Se	282 7.8 We	273 12.5 Jo	248 9.6 Cy	226 12.4 Jo
237 11.2 Sg	241 7.5 Ad	282 7.7 GD	274 12.4 Br	251 9.2 L	237 11.7 Jo
240 11.6 Jo	241 7.4 Hf	283 7.7 GD	283 12.7 Br	267 9.6 L	240 11.3 Jo
245 11.4 Cy	243 7.2 Fd	283 7.7 Wd	284 12.6 L	271 10.0 Cy	246 10.5 Jo
246 11.5 Jo	244 7.6 Mc	286 7.4 Ra	285 12.6 Be	282 9.9 Cy	264 8.6 Pt
246 11.7 L	244 7.1 Ah	288 7.7 GD	S DEL	284 9.9 L	271 7.9 Jo
252 11.4 Cy	244 7.2 We	289 7.7 GD	203816	U CAP	272 8.3 Ah
254 11.6 L	244 7.5 Hf	290 7.7 GD	237 10.0 Jo	*204215*	274 8.1 Ah
264 11.0 Pt	246 7.3 Jo	290 7.6 Wd	246 10.0 O	211 11.4 Bl	277 7.8 Ah
266 11.4 Cy	247 7.5 Sq	290 7.6 Hf	246 10.0 Jo	228 13.3 L	277 7.8 Jo
267 11.1 L	247 7.3 Se	291 7.5 Sh	248 9.8 Cy	248 13.9 L	280 7.7 Ah
268 10.4 Jo	248 7.6 Mc	293 7.7 GD	251 9.8 Jo	V DEL	281 7.7 Pt
269 10.6 Bg	253 7.2 We	295 8.1 Mc	252 9.8 O	204318	284 8.0 Hf
270 10.5 Sg	254 7.0 Ko	297 8.0 Mc	264 9.7 Pt	228 13.7 L	291 8.0 Sh
273 10.0 Jo	257 7.2 Ad	297 7.8 So	268 9.3 Jo	248 12.1 L	292 8.0 Hf
273 11.3 Cy	257 7.6 GD	299 7.8 Sf	271 9.6 Cy	261 11.7 L	V CAP
275 10.5 We	260 7.2 Sh	303 8.2 Mc	272 9.7 Ah	269 11.2 Bg	*210124*
277 10.9 Wd	260 7.2 Hf	U MIC	273 9.3 Jo	272 11.5 L	211 12.1 Bl
277 10.3 Jo	262 7.6 GD	*202240*	281 9.0 Pt	273 11.0 Lg	228[13.2 L
281 11.0 Pt	263 7.1 Ra	211 10.2 Bl	282 9.0 Cy	273 11.4 Gr	249 13.9 L
282 11.2 L	263 7.3 Jo	228 10.5 Bl	282 9.2 Sz	273 11.2 Mg	284[13.7 L
283 10.7 Wd	263 7.5 Pi	237 10.9 Bl	284 9.5 Bg	273 11.3 Sg	TW CYG
289 10.8 Wd	263 7.5 O	254 12.0 Bl	V CYG	274 11.3 Br	210129
291 10.4 Wd	264 7.0 Pt	Z DEL	203847	284 11.8 L	243 11.2 L
V SGE	264 7.2 Sh	202817	236 12.5 Jo	T AQR	252 11.9 L
201520	265 7.1 Pk	228 13.9 L	240 12.7 Jo	*204405*	267 12.5 L
216 12.1 Me	265 7.9 Mc	249 14.4 L	243 12.1 L	214 8.0 Cy	276 12.4 Br
217 12.1 Me	265 7.3 Hf	269 14.4 L	247 12.5 Jo	241 7.7 Hf	284 12.4 L
218 12.4 Me	265 7.0 Ra	285 14.4 L	252 12.2 L	248 8.8 Cy	X CAP
238 11.2 Jo	265 7.6 GD	ST CYG	264 12.3 Pt	264 8.9 Pt	*210221*
247 11.2 Jo	266 7.6 GD	202954	267 13.0 L	271 9.7 Cy	211 11.5 Bl
269 11.5 Bg	266 7.6 So	228 12.8 L	276 12.4 Br	271 10.0 An	238 12.5 Bl
270 11.5 Bg	266 7.5 Sf	249 13.1 L	281 12.7 Pt	280 10.5 An	243 12.8 L
274 11.1 Br	266 7.6 HS	264 13.5 Pt	284 12.9 L	281 10.4 Pt	252 13.8 L
275 11.7 Bg	267 7.6 Mn	267 13.3 L	Y AQR	282 10.2 Cy	281 11.5 Pt
277 10.9 Bg	267 7.9 Mc	274 13.7 Br	*203905*	289 10.8 Ra	X CEP
282 11.3 Bg	268 7.5 Jo	281 13.3 Pt	271[10.8 An	RZ CYG	210382
284 11.3 Bg	268 7.6 GD	283 13.7 Br	281 12.9 Pt	204846	243 9.6 L
293 10.9 Bg	268 7.4 Sh	284 13.4 L	T DEL	264 12.0 Pt	252 9.8 L
U CYG	269 7.6 GD	V VUL	204016	278 11.6 Br	267 10.9 L
201647	270 7.6 GD	*203226*	249 14.8 L	281 11.6 Pt	276 11.5 Br
226 7.2 Jo	271 7.5 Hf	264 8.6 Pt	269 14.3 L	S IND	284 11.1 L
228 7.4 Ah	272 8.0 Mc	281 8.5 Pt	278 14.0 Br	*204951*	RS AQR
232 7.9 GD	272 7.1 Ah	R MIC	280 14.2 Br	211[13.5 Bl	*210504*
234 7.7 GD	274 6.6 Ko	*203429*	284 14.0 L	252[13.1 Ht	228 12.4 L
234 7.4 Jo	274 8.0 Mc	211 9.1 Bl	V AQR	X DEL	249 13.2 L
234 7.1 Se	274 7.5 Mn	238 9.1 Bl	204102	205017	264 13.0 Pt
235 7.5 Mc	275 7.5 We	254 11.1 Bl	243 8.4 L	243 11.2 L	269 13.4 L
235 6.8 Ra	276 7.5 Hf	Y DEL	251 8.3 L	251 11.5 L	284 13.5 L
236 7.3 Ah	276 7.6 Wd	203611	261 8.5 L	264 12.0 Pt	Z CAP
237 7.0 Jo	277 7.6 Wd	228 11.6 L	264 8.5 Pt	266 11.9 L	*210516*
237 7.7 GD	277 7.9 Mc	237 11.4 Jo	272 8.5 L	278 12.8 Br	243 12.1 L
238 7.7 GD	278 7.6 GD	244 11.7 L	281 8.8 Pt	284 12.7 L	252 11.3 L
238 7.5 Mc	281 7.7 GD	246 10.6 Jo	283 8.6 L	UX CYG	269 10.6 L
239 7.6 Mc	281 7.5 Mn	247 11.5 O	W AQR	205030a	281 10.5 Pt
239 6.9 Ko	281 7.2 Ra	251 11.7 L	*204101*	276 14.6 Br	284 9.9 L
240 7.0 Jo	281 7.1 Pt	267 12.4 L	214 12.2 Cy	283 14.6 Br	
240 7.2 Ah	282 7.4 Pa		243 9.6 L		

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
R EQU	Y PAV	W CYG	213753	RY PEG	RV PEG
210812	*211570*	213244	RU CYG	220133a	222129
243 13.5 L	252 5.8 Ht	277 6.4 Mc	277 9.3 Ry	264 11.9 Pt	285 12.6 L
252 13.1 L	282 5.4 Ht	280 6.0 An	277 8.6 Mc	281 12.0 Pt	S LAC
264 12.3 Pt	X PEG	281 6.0 An	281 8.8 Pt	RZ PEG	222439
267 12.2 L	211614	284 5.8 L	282 9.9 Cy	220133b	228 11.9 L
276 11.0 Br	243 13.5 L	285 5.9 An	297 8.2 Mc	226 12.5 L	237 10.8 Ko
281 11.0 Pt	252 13.8 L	295 6.0 Mc	303 8.2 Mc	248 11.9 L	246 10.7 L
285 10.0 L	269 14.5 L	302 6.3 Mc	RV CYG	261 11.6 L	253 10.4 L
T CEP	276 13.9 Br	S CEP	213937	264 10.8 Pt	261 10.2 Ko
210868	281 13.4 Pt	213678	*264* 6.8 Pt	272 10.8 L	261 9.8 L
226 8.4 Jo	283 13.6 Br	214 7.6 Cy	281 6.6 Pt	274 10.9 Cy	264 10.3 Pt
226 8.5 Ko	284 14.0 L	226 8.4 Jo	RR PEG	281 10.1 Pt	274 8.7 Ko
234 8.4 Jo	T CAP	234 8.3 Jo	214024	285 9.9 L	274 9.0 Cy
236 8.9 Ah	*211615*	240 8.4 Jo	276 12.9 Br	T PEG	275 9.1 El
236 9.3 Ra	211 11.5 Bl	242 9.0 We	281 12.8 Pt	220412	272 9.2 L
239 8.7 Ko	238 13.0 Bl	242 9.2 Wr	282 12.7 Cy	243 10.6 L	276 9.0 Br
240 8.7 Jo	243 13.2 L	244 9.4 Ra	283 12.8 Br	252 10.9 L	280 8.5 El
240 8.9 Ah	252 13.2 L	244 8.9 Cy	R GRU	261 11.6 L	281 8.7 Pt
241 9.3 Oy	269 13.3 L	246 8.5 Jo	*214247*	272 12.0 L	284 8.5 Hf
241 9.0 Hf	285 13.8 L	251 8.4 Jo	211 12.9 Bl	278 12.6 Br	285 8.5 L
242 9.3 We	S MIC	252 9.0 Cy	238[12.9 Bl	285 12.6 L	R IND
243 8.9 Fd	*212030*	271 9.6 Cy	254[12.9 En	Y PEG	*222867*
246 8.7 Jo	211[13.4 Bl	273 10.0 Ra	282[12.9 Ht	220613	238 11.5 Bl
248 9.3 Ko	272 10.1 En	281 8.5 Pt	V PEG	278 11.2 Br	241 11.3 Ht
251 8.9 Jo	280 8.9 En	282 9.9 Cy	215605	281 11.5 Pt	252 10.8 Ht
252 9.4 We	Y CAP	302 9.7 Mc	228 12.0 L	RS PEG	254 10.4 Bl
253 9.7 Oy	*212814*	RU CYG	248 10.2 L	220714	262 10.1 Bl
264 9.3 Pt	211[12.0 Bl	213753	258 9.1 L	243 14.2 L	279 9.9 Bl
266 9.6 Hf	243[13.1 L	214 8.1 Cy	264 9.0 Pt	258 14.2 L	280 9.0 En
267 9.5 Sh	254[12.5 Bl	217 8.4 Jo	270 9.4 Fd	270 14.2 L	282 9.1 Ht
267 9.7 Hf	267[13.1 L	218 8.0 Me	270 8.8 L	278 12.5 Br	T TUC
267 10.0 Mn	284[14.3 L	226 8.4 Jo	275 8.6 We	285 14.5 L	*223462*
270 10.1 El	W CYG	226 8.2 Ry	278 9.1 Br	R PSA	220 9.9 Ht
271 9.5 Jo	213244	230 8.2 Ry	281 8.7 Pt	*221230*	241 11.0 Ht
271 9.3 We	227 6.6 L	235 8.4 Jo	285 9.2 L	280 12.5 En	252 12.1 Ht
272 9.6 Ah	235 6.3 Mc	235 8.6 Mc	U PSA	X AQR	272 13.3 En
273 9.8 Ra	237 6.3 Mc	238 8.8 Mc	*215628*	*221321*	280 13.6 En
274 10.2 Mn	238 6.3 Mc	238 8.4 Ry	280[13.0 En	253 14.2 L	R LAC
276 10.3 Oy	239 6.3 Mc	238 8.7 Cy	U AQR	269 14.0 L	223841
277 10.0 Mc	243 6.4 An	239 8.8 Mc	*215717*	285 14.3 L	243 14.4 L
280 10.0 El	244 6.5 An	240 8.5 Jo	243 12.6 L	T GRU	258 14.4 L
281 9.6 Pt	244 6.5 Mc	240 8.5 Ah	252 12.6 L	*221038*	270 14.6 L
281 10.3 Mn	246 6.6 L	245 8.7 Mc	258 12.6 L	279 11.1 En	276 14.3 Br
283 10.2 Wd	246 6.4 An	246 8.5 O	270 12.4 L	S GRU	283 14.2 Br
290 10.5 Wd	248 6.6 Mc	246 8.4 Jo	281 12.1 Pt	*221048*	284 13.3 Rl
290 10.7 Hf	254 6.4 L	248 8.6 Mc	285 12.5 L	220[12.8 Ht	297[10.0 Sq
291 10.1 Sq	255 6.4 An	254 8.5 Ry	S PSA	241[12.8 Ht	S AQR
299 9.5 Mc	257 6.5 An	258 8.9 Ry	*215838*	254[12.8 En	*225120*
RR AQR	259 6.3 An	264 8.6 Pt	280[13.0 En	269[12.8 En	249 8.6 L
210003	264 6.3 An	266 10.5 O	RT PEG	282[12.8 Ht	261 8.8 L
264 12.1 Pt	267 5.9 L	266 10.4 Pi	215934	RV PEG	275 9.0 L
269 12.4 L	267 6.6 Mc	266 10.4 Jo	226 13.8 L	222129	285 9.9 L
281 11.6 Pt	270 6.3 An	268 8.9 Ry	248 11.4 L	243 11.3 L	RW PEG
284 10.5 L	271 6.3 An	271 9.1 Cy	258 10.8 L	252 11.2 L	225914
Y PAV	272 6.0 An	271 10.5 Jo	272 10.9 L	261 11.6 L	243 14.0 L
211570	272 6.4 Mc	272 8.9 Ah	276 10.9 Br	272 12.4 L	258 13.8 L
220 6.4 Ht	273 6.0 An	272 9.1 Ry	285 10.2 An	276 12.5 Br	270 13.1 L
240 5.6 Ht	274 6.1 An	274 8.7 Mc	285 10.3 L	283 12.6 Br	278 12.2 Br

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1933.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
RW PEG	W PEG	Z AND	R AQR	R CAS	R CAS
225914	231425	232848	*233815*	235350	235350
281 12.0 Pt	238 8.8 Jo	242 10.6 Cy	273 7.4 L	230 7.2 Ah	294 7.8 Hf
283 12.0 Wa	240 8.8 Jo	246 10.4 Jo	274 7.1 Ko	236 6.7 Ah	294 7.8 O
284 12.2 L	243 9.5 L	248 10.5 Cy	274 6.6 Cy	237 7.0 Jo	294 7.9 Wd
R PEG	246 9.0 Jo	252 10.5 Cy	281 7.3 Pt	237 7.0 Ra	Z PEG
230110	252 10.0 L	257 10.6 Cy	283 6.9 Hf	239 7.2 Hf	235525
272 9.3 Ah	261 9.9 L	261 10.6 Ko	285 7.5 L	240 7.1 Jo	243 12.5 L
275 8.7 We	268 10.2 Jo	266 10.7 Cy	Z CAS	240 6.7 Ah	252 12.5 L
278 9.0 Br	270 9.9 Fd	271 10.7 Cy	233956	243 7.8 We	269 12.8 L
280 8.9 Ah	272 10.5 L	274 10.6 Ko	240 14.4 L	244 6.9 Ah	278 13.2 Br
281 9.4 Pt	273 10.0 Jo	281 10.1 Pt	246 14.4 L	246 7.0 Jo	281 12.8 Pt
284 9.0 We	274 10.1 Cy	ST AND	283 14.6 Br	257 7.2 Ad	284 12.5 L
284 9.2 Hf	S PEG	233335	TX CEP	261 6.3 Hf	W CET
290 8.5 Hf	231508	237 9.7 Jo	234875	267 6.7 Mn	235715
290 8.4 Wd	243 12.9 L	240 9.8 Jo	278 11.9 Br	268 7.2 Jo	274 8.2 Ko
294 8.1 O	252 12.9 L	242 10.3 Cy	283 12.2 Br	270 7.3 Ra	277 8.3 Cy
V CAS	269 12.8 L	246 10.0 Jo	RR CAS	272 6.7 Ah	283 8.4 Hf
230759	274 12.1 Cy	252 10.3 Cy	235053	273 7.0 Jo	Y CAS
214 9.0 Cy	278 11.6 Br	268 10.2 Jo	278 12.2 Bn	274 7.5 Mn	235855
237 11.0 Ko	281 12.3 Pt	270 10.7 Fd	279 11.7 Bn	277 7.4 Wd	238 10.7 Jo
240 10.6 Ah	285 11.5 L	277 10.0 Jo	286 11.6 Bn	277 7.0 Jo	243 10.2 We
242 10.5 Cy	V PHE	281 11.0 Pt	V CET	278 7.4 Br	243 10.3 L
242 10.3 We	*232746*	289 11.5 O	*235209*	279 8.0 We	252 10.7 L
246 11.0 Ko	241 11.3 Ht	R AQR	258 13.4 L	280 6.9 Ah	261 10.9 L
252 11.0 Cy	252 11.7 Ht	*233815*	269 12.5 L	280 7.2 Ra	271 11.0 L
253 10.0 We	269 12.3 En	237 8.0 Ko	284 11.9 L	281 7.2 Jo	278 11.2 Br
271 12.0 Cy	280 12.4 En	241 7.7 Ht	R TUC	281 7.6 Hf	279 10.8 We
273 11.0 We	Z AND	243 8.0 L	*235265*	281 7.8 Mn	281 11.7 Jo
275 12.1 El	232848	252 7.6 L	125 12.4 En	283 7.7 Wd	282 10.7 Sz
279 11.0 We	212 10.4 Cy	252 7.3 Ht	241[13.5 Ht	289 7.9 Wd	282 11.5 Ra
280 11.9 El	226 10.4 Cy	254 7.5 Sl	252[13.5 Ht	291 7.8 Wd	SV AND
281 12.2 Pt	237 10.8 Ko	261 7.7 L		291 7.6 Sh	235939
282 12.0 Cy	238 11.0 Jo	261 7.8 Ko		292 7.7 Hf	278 13.1 Br

RAPIDLY VARYING IRREGULAR VARIABLES.

Unfortunately the limitations of space make it impossible to include the observations of the stars of this class. They will, however, be included in the reprints at the end of the year. ED.

SUMMARY FOR JULY AND AUGUST, 1933.

Observer	Initial	Vars.	Observations	Observer	Initial	Vars.	Observations
Ahnert	Ah	40	117	Campbell	C	2	8
Aldwell	Ad	12	17	Cap	Cp	11	17
Ancarani	An	21	73	Cilley	Cy	80	315
Armfield	Ar	6	70	Cunningham	Cu	1	1
Baldwin	Bl	91	438	Eliason	El	61	98
Bappu	Bm	13	41	Ensor	En	106	471
Benini	Be	17	26	Ford	Fd	32	36
Bigelow	Bw	24	30	Friton	Fn	4	16
Boyd, A. F.	Bo	1	1	Godfrey Club	GD	4	52
Brocchi	Br	79	108	Gomi	Go	2	8
Brown, A. N.	Bn	4	17	Goodsell	Gs	7	9
Buckstaff, R.N.	Bc	9	49	Grandstaff	Gr	7	10
Buckstaff, E.F.	Bf	5	20	Grunwald	Gw	5	12
Bunch	Bh	5	8	Haas	HS	10	23
Bunting	Bg	11	23	Hess, A. P.	Hp	1	3

Observer	Initial	Vars.	tions Observa-	Observer	Initial	Vars.	tions Observa-
Hess, C. L.	He	6	7	Pickering	Pi	10	13
Hildom, A.	Hi	11	28	Raphael	Ra	33	84
Hildom, L.	Hl	8	13	Recinsky	Rc	6	35
Hartmann	Hf	56	180	Reynolds	Rl	6	7
Houghton	Ht	82	406	Rosebrugh	Rb	1	8
Hunt	Hv	7	10	de Roy	Ry	9	97
Jones	Jo	104	465	Ruben	Ru	5	23
Kaho	Ka	1	3	Scanlon	So	20	32
Kohman	Ko	37	170	Schenkman	Se	8	36
Lacchini	L	180	785	Shinkfield	Sl	27	90
Logan	Lg	6	33	Shultz	Sz	12	16
McLeod	Mc	31	200	Skaggs	Sg	8	13
Meek	Me	54	113	Smith,F.P.	Sq	11	13
Mennella	Mn	11	34	Smith,F.W.	Sf	12	33
Menzel	Mz	1	1	Smith,L.	Sh	16	26
Monnig	Mg	43	95	Thew	Tw	2	2
O'Byrne	Oy	16	37	Watson	Wa	11	20
Olcott	O	32	50	Webb	Wd	34	78
Parthe	Pa	6	11	Wetherbee	We	65	171
Peltier	Pt	203	532	Wright	Wr	8	9
Perkin	Pe	2	2				
Perkinson	Pk	2	7	Totals		72	425	6105

LEON CAMPBELL, *Recorder.*

September 13, 1933.

Meteor Notes from the American Meteor Society

By CHARLES P. OLIVIER, President

The annual shower of Perseids in 1933 was observed by large numbers of persons who very kindly reported their observations, in accord with requests that had appeared in the newspapers. The excellent coöperation of the Associated Press and Science Service now permits us to reach many interested individuals, and as a consequence meteoric astronomy is becoming constantly more widely known to the public with many good results to itself. Therefore in 1933, despite the facts that most of the Atlantic seaboard states were under a cloud blanket and that the moon, near last quarter, greatly interfered after the earlier hours of the nights near maximum, still so many reports came from other sections that we have excellent cross-sections of the stream. We would usually have received about a hundred reports from the cloudy eastern area.

While reports continue to arrive daily, Table I contains the names of 188 persons (or groups) who have sent in enough data to justify inclusion. Others who sent in merely a few casual notes are excluded. These 188 reports from non-members were received from 6 Canadian provinces and 36 states. From members, 37 reports add 3 more states; several members have not as yet sent in their records. Table II contains members' reports. Radiants and any other results of importance, derived from a study of the meteors actually charted, will appear later.

It has seemed best to represent the mean results of Table I for the four dates nearest maximum according to the hour-belt in which the station was situated. In order are given: date, and, for each section, the mean rate per hour and the number of separate counts on which the rate is based. The data from Table II are not used herein, as most of the members inevitably lost meteors while plotting;

most persons in Table I counted only.

		E.S.T.		C.S.T.		M.S.T.		P.S.T.		Average	
		Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.
Aug.	10-11	11.8	5	18.6	10	31.0	2	7.2	2	16.9	19
	11-12	35.3	45	36.7	80	34.5	13	27.1	9	35.5	147
	12-13	14.7	15	21.5	14	16.0	3	13.2	2	17.5	34
	13-14	9.7	2	8.6	5	11.6	3	21.0	1	10.7	11

It is believed that the above figures give an excellent picture of the richness of the Perseid stream (plus of course casual meteors on these dates, though a very few observers tried to count Perseids only) from about 8:00 P.M. to midnight, local time, for North America between latitudes +27° and +55°. Fewer counts than usual were made after midnight, because of moonlight. This fact, plus the moonlight itself, would in the long run cut down the figures to about one half of what would have been seen for the whole night under ideal conditions. When this allowance is made, 1933 appears to have furnished just the normal Perseid display, with the maximum on the night of August 11-12.

While many observers reported seeing fireballs of some brilliancy, unfortunately duplicate observations have not yet been received. Special plans for height observations were made by several members in New Jersey and Pennsylvania, including Flower Observatory, but were ruined by clouds. The writer himself was at the hospitable home of Mr. J. A. Kingsbury in the Catskill Mountains, New York, for the nights of August 11-12 and 12-13. For the first, on which the maximum was due, Mr. Kingsbury gave a "meteor party," about fifty guests attending, but clouds prevented any worth-while observation. The next night was beautifully clear, but the maximum was very definitely over. For several years past, Mr. and Mrs. Kingsbury have been giving, for the Perseids and Leonids, "meteor parties" which are largely attended. These are not only most pleasant to the guests, but spread some knowledge of meteoric astronomy among large groups. The idea is passed on to other members who may own country homes. It is well worth imitating.

To all persons who reported on the Perseids our sincere thanks are given, and the hope is expressed that they will lend their services for the Leonids in November. It is exactly one hundred years since the grand 1833 shower, and we have many reasons for hoping for an excellent one this year, though we do not expect it to rival that of a century ago. Instructions will be mailed to anyone who requests them.

TABLE I.

Observer and Station	1933 Aug.	Began	Ended	Total	Met.	F.	Rate	Cr.R.
Miller, Mrs. G. F.	11	11:00	13:00	120	14	1.0	7.0	7.0
Superior, Arizona	13	10:30	12:00	90	19	..	12.7	..
Price, Mrs. J. B.	11	8:30	10:00	90	66	..	44.0	
Wickinburg, Arizona		14:00	15:00	60	21		21.0	
	12	8:30	9:00	30	6		12.0	
	13	8:00	9:00	60	8		8.0	
Burrow, Miss S. L., Altus, Ark.	11?	11:30	16:20	290	143		29.6	
Stevens, Mrs. J. A., Grand Lake, Ark.	11	12:00	13:00	60	28		28.0	
(*1) Alsobrook, W.R., Star City, Ark.	11	13:25	14:25	60	14		14.0	
Stone, Wm. R. July	28	12:00	13:00	60	7	1.0	7.0	7.0
Santa Barbara, Calif. Aug.	10	10:30	14:45	255	10		2.4	
	11	10:00	15:30	330	39		7.1	
	12	9:30	15:00	330	29		5.3	
Gregory, C. R., Westminster, Colo.	11	10:30	14:45	205	169	0.8	48.3	60.4
(*2) Lisk, Miss H., Fort McCoy, Fla.	11	8:15	16:20	485	587		..	

Observer and Station	1933 Aug.	Began	Ended	Total	Met.	F.	Rate	Cr.R.
(*3) Smith, F. P., Atlanta, Ga.	12	13:00	14:00	60	9		9.0	
Black, J. E., Boise, Idaho	11	10:20	11:20	60	33		33.0	
Redington, Mrs. L. B.	10	9:00	10:00	60	8		8.0	
Horseshoe Bend, Idaho	11	9:00	12:00	180	54		18.0	
Golz, N., Aurora, Illinois	11	9:30	13:30	240	173		43.3	
Merrill, Mrs. W. J., Astoria, Ill.	11	8:30	9:30	60	55		55.0	
Anderson, R., Chicago, Ill.	10	10:45	16:00	315	40		7.6	
	11	8:45	9:00	15	3		..	
		9:40	15:35	355	88		14.9	
(*4) Jerrems, T. W., Chicago, Ill.	11	13:00	14:00	60	12		..	
Noone, Miss A. W., Chicago, Ill.	13	11:55	12:30	35	8±		..	
O'Brien, H., Chicago, Ill.	11	12:15	13:15	60	33		33.0	
(*5) Walker, Miss A. B., and Sherman, Miss M., Chicago, Ill.	11	9:25	10:25	60	26		..	
Clark, P., Collinsville, Ill.	11	9:16	10:16	60	32		32.0	
Abrahamson, Miss E., Deerfield, Ill.	11	8:50	9:50	60	39		39.0	
Biro, Miss E. B., Des Plaines, Ill.	11	9:35	10:30	55	49		53.4	
Paynter, R. T., Glencoe, Ill.	11	14:45	15:45	60	32	0.7	32.0	45.7
Bolan, E., Hinsdale, Ill.	11	12:30	13:30	60	44		44.0	
(*6) Glass, F. L., La Salle, Ill.	11	8:30	10:30	120	47		..	
Taylor, A. R., Peoria, Ill.	10	13:30	14:30	60	6		6.0	
	11	13:00	14:00	60	17		17.0	
	12	13:30	15:00	90	16		10.7	
Ross, A., Sparta, Ill.	11	8:15	12:30	255	100		23.5	
Baynham, G. A., Taylorville, Ill.	10	12:00	15:32	212	27		7.6	
	11	13:00	15:30	150	50		20.0	
Durham, O. C., Waukegan, Ill.	11	8:40	9:40	60	47		47.0	
(*7) MacFarlond, B., Wilmette, Ill.	10	10:15	11:15	60	33		33.0	
	11	10:45	12:45	120	194		97.0	
(*6) Wolf, Miss J. R., Wilmette, Ill.	11	10:00	11:00	60	45		..	
Carsley, D. R., Zion, Ill.	11	11:00	12:00	60	64		64.0	
Starr, Mrs. J., Grovertown, Ind.	11	8:50	10:00	70	71		60.9	
Starr, J., Grovertown, Ind.	11	8:50	10:00	70	69		59.2	
(*8) Jardine, Miss M., LaPorte, Ind.	11	9:15	10:15	60	47		..	
Hielscher, P. E., Thayer, Ind.	11	8:30	9:30	60	44		44.0	
Wynegar, A. R., Cedar Falls, Ia.	10	11:45	12:45	60	25		25.0	
Allen, V. G., Jr., Anthony, Kans.	12	11:00	12:00	60	20		20.0	
Blessing, E. A., Chanute, Kans.	11	8:30	11:00	150	106	0.9	42.4	47.1
Campbell, C. E., Council Grove, Kans.	11	12:45	13:40	55	46	0.7	50.2	71.7
(*9) Dieterich, Mrs. F. V., Ellinwood, Kans.	11	10:00	11:00	60	63		..	
Platner, Miss C., Ellis, Kans.	10	9:30	10:30	60	12		12.0	
(*10) Darlington, J.W., Holton, Kans.	11	9:30	10:30	60	64	1.0	..	
(*5) Stewart, Miss B. S., Independence, Kans.	10	13:00	14:15	75	41		..	
Lockhart, C. H., Junction City, Kans.	11	12:00	12:30	30	19		38.0	
(*6) Davis, Miss A.M., Lenexa, Kans.	11	8:30	9:30	60	59		..	
Adamson, Mrs. C. R., Liberal, Kans.	12	11:00	12:00	60	30		30.0	
Mosher, W. D., Liberal, Kans.	12	9:30	12:30	180	99		33.0	
(*5) Hook, Z. W., Manhattan, Kans.	11	12:00	13:00	60	47		..	
Marlatt, F. A., Manhattan, Kans.	11	9:30	11:00	90	47		31.3	
	12	8:30	10:00	90	12		8.0	
	13	9:00	10:00	60	2		2.0	
Kirchhofer, Mrs. F., Peabody, Kans.	11	12:30	14:00	90	60		40.0	
(*11) Hamilton, B., Wichita, Kans.	10	8:00	14:30	390	56		..	
	11	8:00	16:00	480	110		..	
	12	8:00	12:00	240	28		..	
(*5) Mulconery, Miss M., and Ridings, Miss R., Wichita, Kans.	11	13:00	14:00	60	103		..	
(*5) Carpenter, L. B., Bowling Green, Ky.	11	7:45	10:30	165	71		..	

Observer and Station	1933 Aug.	Began	Ended	Total	Met.	F.	Rate	Cr.R.
Johnstone, W. C., Paducah, Ky.	11	8:15	9:15	60	47		47.0	
Clow, Mrs. J. E., De Quincy, La.	11	12:00	13:00	60	17		17.0	
Flanagan, P. W., New Orleans, La...	11	12:00	14:00	120	38		19.0	
	12	12:00	16:00	240	121		30.3	
Vose, A. G., Caribou, Me.	11	13:05	14:05	60	42		42.0	
Vose, T. S., Caribou, Me.	11	13:05	14:05	60	42		42.0	
Vose, C. E., Caribou, Me.	11	13:05	14:05	60	31		31.0	
Vose, Miss R. M., Caribou, Me.	11	13:05	14:05	60	45		45.0	
Clark, Miss D., Caribou, Me.	11	13:05	14:05	60	44		44.0	
Drummey, W. J., Ellsworth, Me.	11	12:00	13:00	60	22		22.0	
(*12) Porter, B. H., Houlton, Me.....	11	7:30	12:30	240	203	0.9	50.8	56.2
Brown, M. O., Jefferson, Me.	11	8:30	9:30	60	57		57.0	
Claven, G., Lewiston, Me.	11	9:15	10:15	60	17		17.0	
Marshall, G., Lewiston, Me.	11	10:00	11:00	60	16	1.0	16.0	16.0
(*13) Rieger, G. W., Monmouth, Me..	11	9:33	9:54	21	51		..	
Dudley, R. B., Norway, Me.	11	8:05	9:05	60	63		63.0	
(*14) Wright, C. C., Paris, Me.	11	8:10	9:10	60	48	1.0	48.0	48.0
					63		63.0	63.0
					60		60.0	60.0
		8:40	9:10	30	27	1.0	54.0	54.0
		9:10	10:10	60	76	0.9	76.0	84.4
					73		73.0	81.1
					69		69.0	76.6
					66		66.0	73.3
Allen, D. H., Poland, Me.	11	10:00	11:00	60	58		58.0	
Cheeseman, C. W., Sabattus, Me.	11	9:00	9:30	30	3		6.0	
(*15)		12:30	16:00	210	56		16.0	
(*16) Merriam, G.H.,Skowhegan,Me..	11	9:00	10:00	60	>60		..	
(*8)		13:00	14:00	60	>100		..	
Abbey, Miss M.L., Sunderland,Mass..	12	10:00	11:00	60	12		12.0	
Brown, D., Wellesley, Mass.	12	9:30	12:00	150	8		3.2	
(*24) Holland, R., Woburn, Mass. ...	12	8:15	10:00	105	14		7.9	
Paschen, L. L., Bloomingdale, Mich..	11	9:10	10:12	62	82		79.4	
(*17) Morrow,Mrs.E.J.,Coloma, Mich.	11	9:45	11:15	90	50	1.0	33.3	33.3
(*6) Herrmann, Mrs.,W. G., Detroit..	11	12:20	13:20	60	20	1.0	..	
Vann, M. J., Detroit, Mich.	10	14:15	15:15	60	9		9.0	
	11	12:15	14:15	120	41		20.5	
Alarie, A. J., Flint, Mich.	11			180	200±			
Goodman, T. P., Harbert, Mich.	11	12:45	13:15	30	15		30.0	
Landreville, H. S., ...	11	11:55	14:00	125	19		9.1	
Hermansville, Mich.	12	11:00	13:00	120	41		20.5	
Swanson, W. E., Iron Mt., Mich. ...	11?	11:00	13:00	120	43		21.5	
Baxter, G., Kalamazoo, Mich.	11	11:46	13:46	120	94	0.8	47.0	58.8
Gibson, E. A., Kalamazoo, Mich.	11	12:00	15:00	180	103		34.3	
Doty, C., Ludington, Mich.	11	10:20	11:20	60	35		35.0	
(*8) Frederick, L. H., ...	11	8:20	9:20	60	65		..	
Macatawa, Mich.		12:10	13:10	60	48		48.0	
Higgins, E. W., Muskegon, Mich.....	11	10:30	11:30	60	32	1.0	32.0	32.0
		15:00	15:20	20	12		..	
(*17) Adamson, G. A., ...	11	14:15	15:15	60	40		40.0	
(*18) Tecumseh, Mich.					39		39.0	
Ohlson, J., Three Oaks, Mich.	11	10:15	11:15	60	12		12.0	
	12	9:45	10:45	60	68		68.0	
Johnson, E. L., Wyandotte, Mich.....	11	11:52	12:52	60	37		37.0	
	13	11:45	12:45	60	9		9.0	
(*19) Walle, M. P., Hibbing, Minn...	11	9:10	10:10	60	14		..	
(*19)		11:15	11:30	15	4		..	
(*19)	12	9:40	10:48	68	8		..	
(*5) Stearns, H., and Hoyt, W. M., III, Tower, Minn.....	11	14:00	15:40	100	97		..	
Eley, F., Scooba, Miss.	10	11:00	12:00	60	13		13.0	

Observer and Station	1933 Aug.	Began	Ended	Total	Met.	F.	Rate	Cr.R.
Eley, F., Scooba, Miss.		15:00	16:00	60	9		9.0	
Kelley, E. K., Hamilton, Mo.	11	8:30	9:30	60	22		22.0	
Stevens, E. J., Marshall, Mo.	11	8:30	9:30	60	35		35.0	
Fish, Miss P., Pollock, Mo.	11	9:00	10:00	60	67		67.0	
Olson, O. N., Brockton, Mont.	11	11:30	12:30	60	38		38.0	
Tout, G. H., Harlem, Mont.	11	9:45	12:00	120	61		30.5	
Kees, Miss C., Beatrice, Neb.	11	15:00	16:00	60	21		21.0	
Jackson, Miss B., Cortland, Neb.	11	9:00	10:00	60	50		50.0	
Fritch, Mrs. C., Table Rock, Neb.	11	8:45	9:45	60	33		33.0	
Jenkins, L., Keene, N. H.	12	8:15	11:00	120	41	0.8	20.5	25.6
Wheeler, G. K., Keene, N. H.	12	8:15	9:45	90	33	1.0	22.0	22.0
		10:30	11:30	60	11	0.3	11.0	..
Carlton, Miss E. B., Lake Winnipesaukee, N. H.	12	10:00	11:00	60	5	0.1	..	..
(*20) Rierdon, Miss P., Albuquerque, N. M.	11	15:30	16:30	60	27		..	
(*21) Mills, E. W.,	11	9:45	10:45	60	51		51.0	
(*21) Brainardsville, N. Y.		12:00	13:00	60	43		43.0	
Kleinberg, J., Brooklyn, N. Y.	12	10:08	11:01	53	5		5.7	
Smith, C., Geneva, N. Y.	11	10:35	12:05	90	50		33.3	
Rogers, A. G., Geneva, N. Y.	11	9:48	11:55	120	58		29.0	
Cobb, H. W., Great Neck, N. Y.	11	14:08	15:08	60	21		21.0	
		15:10	16:10	60	43		43.0	
Langlois, Miss P., Schenectady, N.Y.	12	10:20	11:20	60	12		12.0	
Reilly, T. J., Schenectady, N. Y.	13	12:00	13:00	60	15		15.0	
(*30) Blaauw, Mrs. M., Snyder, N.Y.	12	10:00	13:00	180	25		..	
(*22) Schamm, C. G., Jr.,	11	11:00	12:00	60	17		17.0	
Syracuse, N. Y.					22		22.0	
					16		16.0	
		12:00	13:00	60	22		22.0	
					22		22.0	
Rooney, J. F., Manning, N. D.	12	8:30	10:00	90	33	0.9	22.0	24.4
Cervenka, F., Pisek, N. D.	11	10:00	13:00	165	78		28.4	
Dundon, W. J., Wahpeton, N. D.	11	9:50	15:00	310	134		25.9	
(*23) Black, J. L., Cleveland, O.	10	12:25	14:00	95	4		..	
Shafer, E. S., Cleveland, O.	11	13:05	14:05	60	28		28.0	
(*24) Cassady, W. B.,	11	9:15	11:00	105	11		6.3	
Cortland, O.		14:00	16:10	130	15		6.9	
	13	9:00	10:33	93	7		4.5	
	15	9:00	13:15	255	26		6.1	
	19	8:32	15:03	391	51		7.8	
(*24) Durst, C. E., Dayton, O.	10	14:15	16:25	130	20		9.2	
(*25)	12	9:15	11:54	99	72		..	
(*25)		12:16	13:44	88	48	0.3	..	
Moore, E. H., Elyria, O.	11	14:15	16:15	120	23		11.5	
	12	14:15	15:15	60	1		1.0	
(*26) Doolittle, Miss M., and	10	10:00	11:30	90	11		7.3	
Halle, Miss J., Kirtland, O.	11	9:00	10:00	60	4		4.0	
(*6) Miller, Mrs. M. H.,	11	9:15	10:15	60	28	1.0	..	
New Paris, O.	12	9:15	10:10	55	18		19.6	
(*27) Dooley, Miss A.,	10	15:05	16:05	60	19		19.0	
Springfield, O.	12	10:45	11:45	60	23	1.0	23.0	23.0
	13	10:00	10:20	20	5		..	
	14	10:00	10:10	10	6		..	
Imler, H. C., Whisler, O.	11	15:30	16:30	60	27	0.9	27.0	30.0
Pahl, F. J., Eddy, Okla.	11	9:40	10:40	60	48	1.0	48.0	48.0
Mercer, J. W., Lambert, Okla.	11	9:10	10:10	60	24		24.0	
Oman, D. E., Muskogee, Okla.	11	14:05	14:25	20	15		..	
Vance, Mrs. L. M. L., Perry, Okla.	11	9:30	10:30	60	16		16.0	
Fleming, Miss H., Tulsa, Okla.	11	12:00	14:30	150	55		22.0	
Fortner, Miss F. F., Wynona, Okla.	11	12:00	13:00	60	17		17.0	

Observer and Station	1933 Aug.	Began	Ended	Total	Met.	F.	Rate	Cr.R.
(*6) Barringer, L.B.,Canadensis, Pa..	12	14:00	15:00	60	20		..	
McSherry, R. R., Johnstown, Pa.	11	12:15	13:15	60	23		23.0	
(*5) Anderson, Misses E. and S., ...	11	12:30	14:00	90	34		..	
(*28) Royersford, Pa.	12	10:00	13:00	180	81		..	
Wass, J. N., Beresford, S. D.	11	12:00	13:00	60	29		29.0	
(*14) Kensinger, Mrs. L. H., ...	11	9:05	10:05	60	35		35.0	
Vermillion, S. D.					43		43.0	
					38		38.0	
	12	9:00	10:00	60	15		15.0	
					14		14.0	
					16		16.0	
	13	9:00	10:00	60	8		8.0	
					10		10.0	
					14		14.0	
Monserud, Miss H., Waubay, S. D...	11	14:00	15:00	60	51		51.0	
Monserud, Miss W., Waubay, S. D..	11	14:00	15:00	60	49		49.0	
Turner, P. R., Bemis, Tenn.	11	10:51	11:51	60	17		17.0	
		12:51	13:51	60	57		57.0	
Thompson, Miss, E. Nashville. Tenn..	11	12:00	13:00	60	20		20.0	
(*9) DeWitt, J. H., Jr., Nashville....	11	8:07	10:07	120	107		..	
Jackson, J., Memphis, Tenn.	11	13:07	14:27	80	11		8.2	
(*22) Baten, Miss J. B., ...	11	13:00	14:00	60	17	0.1	17.0	..
Abilene, Texas					15		15.0	
Trexler, J., Dallas, Texas	10	9:00	10:00	60	64		64.0	
	11	9:10	10:10	60	125		125.0	
Hughes, Miss L. C., Edgewood, Tex..	11	12:00	13:00	60	59		59.0	
Honk, R. W., Fairbanks, Texas	11	11:10	12:30	80	31		23.2	
Martin, Mrs. C., Kirbyville, Texas...	11	13:10	16:20	180	141		47.0	
Kemp, Miss A. H., Seymour, Texas..	11	10:18	11:31	73	7		5.8	
	12	8:37	11:21	164	13		4.8	
Farr, Miss S., Brandon, Vt.	11	9:00	10:00	60	50	0.8	50.0	62.5
		10:00	11:00	60	14	0.5	14.0	28.0
Meade, S. H., Coeburn, Va.....	11	10:00	11:00	60	35		35.0	
(*17) Feldman, R. L.,								
East Falls Church, Va.	12	8:00	9:00	60	9		9.0	
Stutler, I. A., Salem, W. Va.	12	9:45	10:45	60	9		9.0	
		13:20	14:20	60	46		46.0	
Bumgardner, Miss G., ...	11	10:30	12:30	120	43		21.5	
West Milford, W. Va.	12	13:30	15:30	120	37		18.5	
Zimmer, Miss D., Greenleaf, Wis. ...	11	8:00	9:30	90	61		40.7	
Goerz, Miss L. R., Jefferson, Wis....	11	12:05	13:05	60	32		32.0	
(*5) Grams, Mrs.F.,Manitowoc,Wis..	11	8:30	9:30	60	81		..	
Fast, E. E., Milwaukee, Wis.	11	10:00	12:00	120	34		17.0	
Horner, E., Racine, Wis.	11	8:45	9:45	60	58±		58	
Nelson, O., Sherman Hill, Wyo.	11	14:30	15:30	60	48		48.0	
Six casual observers					24			

CANADIAN REPORTS.

Observer and Station	1933 Aug.	Began	Ended	Total	Met.	F.	Rate	Cr.R.
Schmidt, R., Edmonton, Alberta.....	11	10:30	11:15	45	27	1.0	36.0	36.0
Toth, Miss L., Hanna, Alberta.....	11	12:00	13:00	60	52		52.0	
	12	12:00	13:30	90	27		18.0	
Hillquist, E., Metiskow, Alberta.....	11	11:45	12:45	60	38		38.0	
		14:07	14:18	11	11		..	
Kay, R., Vegreville, Alberta.....	10	10:30	11:30	60	54		54.0	
(*29) Breitner, A., Cawston, B. C....	11	9:23	11:26	123	37		18.1	
(*5) Skillicorn, Mrs. T., ...	11	11:00	12:00	60	5		..	
(*5) Cranbrooke, B. C.	12	11:00	12:00	60	35		..	
Davidson, A., Invermere, B. C.	12	10:30	13:30	180	54		18.0	
	13	10:00	12:00	120	28	0.8	14.0	17.5

Observer and Station	1933 Aug.	Began	Ended	Total	Met.	F.	Rate	Cr.R.
Harvey, E. G., Kelowna, B. C.	11	12:00	13:00	60	62		62.0	
Jackson, F.G.,New Westminster,B.C..	11	10:30	12:15	105	47		26.8	
Hayward, Mrs. C. M., ...	11	9:00	10:00	60	25		25.0	
Princeton, B. C.	12	9:00	11:00	120	42		21.0	
	13	9:00	10:00	60	20		20.0	
Shiell, Miss K., Steveston, B. C.	10	12:30	13:30	60	12		12.0	
	11	11:30	13:00	90	17		11.3	
Dand, M., Vanvouver, B. C.	11	8:50	10:50	120	60		30.0	
(*5) Hetherington, Miss F., Vancouver	12	9:12	10:36	83	43		..	
(*6) Whitehead, E., ...	10	9:00	10:30	90	7		..	
(*6) Vancouver, B. C.	11	8:20	10:10	90	44		..	
Vaughan, J. W., W.Vancouver, B.C..	11	11:45	12:45	60	30		30.0	
Dickinson, L. D., Winnipeg, Man. ..	11	14:15	15:15	60	61		61.0	
Guttormsson, R., Winnipeg, Man. ...	11	9:25	10:25	60	30		30.0	
Abdou, M. P., Fort William, Ont. ..	10	15:45	16:00	15	7		..	
S——, J. J., Kenora, Ont.	11	14:30	15:30	60	23		23.0	
(*9) Reynolds, J.A., Kincardine, Ont..	11	10:25	11:20	55	34	0.5	..	
(*5) Hogg, Miss M. B., and Mar- ...	11	14:30	15:00	30	20	0.5	..	
(*5) tin, Miss M. A., Kincardine	13	14:15	14:45	30	9		..	
(*5) MacDonald, Miss O., Picton, Ont.	11	9:35	9:56	21	25		..	
Plewman, M., Richmond Hill, Ont...	10	10:00	12:12	132	25		11.4	
Plewman, B., Richmond Hill, Ont...	10	10:00	12:12	132	27		12.3	
(*9) Des Meules, Mrs. S. A., Bonaventure, Quebec	11	9:25	10:15	50	137		..	
Taylor, L. J., Estevan, Sask.	11	12:00	13:00	60	15		15.0	
Epp, Miss E., Saskatoon, Sask.....	11	9:55	10:55	60	53		53.0	

TOTAL NUMBER OF METEORS REPORTED.....11,499

REMARKS.

(1) Observed NW only. Low cloud overshadowed sky. (2) Group of observers, working 2, 3, or 4 at a time. Maximum between 12 and 13 h. (3) "Rather cloudy." (4) View restricted by trees and houses. (5) Two observers. (6) "We," or more than one observer. (7) Aug. 10 from Dearborn Obs.; Aug. 11 from West Evanston, Ill. (8) Three observers. (9) Group of observers. (10) Four observers. (11) Observations with "an arrangement of mirrors"; rates cannot be computed. (12) From window with "unobstructed view." Maximum 11:30 to 12:30. (13) Thirteen observers. No duplicates reported. (14) Individual counts by separate observers of group. (15) Maximum between 14 and 15 h. (16) Twelve observers. (17) Observing NE. (18) Observing NW. (19) Two observers; paths plotted. (20) Two observers; not out of doors. (21) Three observers, but individual counts, same for each person. (22) Observers of group reported individually. (23) From attic window. (24) Record of each. Rates therefore low. (25) Four observers; notes on each meteor. (26) Two observers, but individual count, same for each. (27) From window. (28) Five observers. (29) Paths plotted. (30) Two observers; 19 plotted.

Table I gives observations reported by non-members for the Perseid epoch, arranged alphabetically by states. Observations received from Canada are given at the end of this table. Table II gives observations from members. Unless it is otherwise stated in the Remarks, meteors reported in Table II were plotted; those in Table I were not plotted, although some were described in detail.

Corrected rates have not been computed unless the sky conditions were carefully described. The times of observation have been reduced to the local standard time whenever possible. On August 11, the moon rose about ten o'clock, and rates after that were necessarily lowered.

(For lack of space Table II must be deferred until the next issue.)

Flower Observatory, Upper Darby, Pennsylvania, 1933 September 22.

The Athens Meteor and Meteorite

By C. C. WYLIE and STUART H. PERRY

The Athens Meteor fell at about 9:30 A.M. on July 11, 1933. Our first notification of the fall was a newspaper item which came to the attention of Father J. A. Theobald of Columbia College, Dubuque, Iowa. Since learning of the fall, we have been in correspondence with several persons in the community, including W. R. Hardiman who recovered the meteorite, and Miss Velma McLemore, a neighbor. Prof. L. D. Hampton of Alabama Polytechnic Institute, Auburn, Alabama, visited the community and personally interviewed Mr. Hardiman and others.

Mr. Hardiman is a farmer living about six miles west of Athens, Alabama. He and his son were working in the field that forenoon when their attention was attracted by a peculiar humming or singing noise, like an airplane flying high. This noise grew louder, in their opinion for five minutes. It changed to a whizzing noise and ended in a swish and a thud. The object making the thud struck within 30 feet of the son. He walked over, expecting to find an object weighing 100 pounds, but found a small hole perhaps five inches across and five inches deep, with a small dark stone in it. The stone had fallen vertically, as nearly as he could tell. He did not, however, touch it until his father had arrived from a more distant part of the field. The little stone, weighing about nine ounces, was then removed and found to be noticeably warm, but not hot.

The day was cloudy in the vicinity of Athens, and no one saw the meteor. Newspaper requests brought in no reports from other communities, so perhaps the clouds were general. Two boys picking berries were frightened when they heard a little cloud singing. Other persons in the community heard the hum. Probably stones other than this small nine-ounce object fell. Detonations were, however, not pronounced. Mr. Hardiman himself heard none; but apparently several persons living fifteen or twenty miles northeast of the point of fall did hear explosions at that time. They certainly did not attract any general attention.

The absence of pronounced detonations suggests that the meteor fell at a high angle, that no large masses reached the earth, and that the meteor did not have a high velocity. The direction of striking was almost vertical, which is normal for a small stone and consequently tells us nothing. The Hardimans are positive that the stone was noticeably warm, which is a temperature higher than normal. This suggests that the meteor was in the ball-of-fire state for a longer time than is normal; and this in turn implies either a low velocity or a low angle. The observed facts taken together suggest: (1) a high angle of fall for the meteor, coming from the northeast; (2) a meteor of relatively low velocity; (3) that no large masses reached the earth; and (4) that other small stones fell.

The only stone recovered, which weighs 264 grams, is a complete individual, strikingly pitted and with crust about 95% complete. It is of an irregularly rounded form, appearing almost quadrangular in outline in most positions, but bounded roughly by five sides instead of six. Its greatest dimensions are 5, 5, and 6.5 centimeters.

The two larger sides, shown in Figure 1, show a rounded, smoothly-crusted surface, slightly cracked or crazed, and without trace of pitting. A third side or end, slightly broken, and a fourth side adjoining the first three, as shown in Figure 1, are less regular and slightly pitted.

The fifth side, opposing the four above mentioned, and shown in Figure 2, is very irregular, with deep pits and prominent ridges and points. The crust on this

side is thicker and in many places appears finely and irregularly wrinkled or scoriaceous.

The distinct flow structure of the crust around edges and corners would indicate that the side bounded by the smooth rounded surfaces, shown in Figure 1, was forward in flight despite the lack of pitting. This conclusion is strengthened

FIGURE 1.

FIGURE 2.

by the fact that a small spot about half a centimeter square, at the edge of the rough area and adjoining one of the two smooth sides, was broken in flight. This spot shows a partial secondary crust with distinct evidence of flowage of the melted material around the edge from the smooth side of the mass.

A broken area of about four square centimeters on one of the smooth sides—the third side or end before referred to—shows the stone to be a gray chondrite with a relatively large amount of troilite. The material is so friable that it is easily rubbed up between the fingers.

Under the microscope minute grains of nickel iron may be observed, which

are easily attracted by a magnetized needle, and a small quantity of the powdered material reacted strongly for nickel by the dimethylglyoxine test.

Since the stone was found, perhaps a little more than a gram has been removed from the chipped end, so its original weight may have been about 265 grams.

In conclusion, we state that the description of the phenomena of fall is by C. C. Wylie, primarily from the report of L. D. Hampton; and that the description of the meteorite is by Stuart H. Perry.

University of Iowa, September 22, 1933.

Another South Carolina Meteorite

By C. C. WYLIE

Mr. Stuart H. Perry of Adrian, Michigan, wires that he has just received a 12-pound meteorite from South Carolina. It is reported that the meteorite fell about July 1, 1933, near the North Carolina state line, but other particulars have not as yet been received. The meteorite is a gray spherulitic chondrite.

Further particulars will be published at a later date.

University of Iowa, September 25, 1933.

Notes from the Society for Research on Meteorites

By FREDERICK C. LEONARD, President and H. H. NININGER, Secretary

The Organization Meeting of the Society

The organization meeting of the Society for Research on Meteorites was held, through the courtesy of Director S. C. Simms and Dr. O. C. Farrington, at the Field Museum of Natural History, in Chicago, Illinois, on August 21 and 22, 1933.

Fifteen of the approximately fifty-five charter members of the Society were present at the meeting, which was marked by unusual interest and much enthusiasm. A constitution and a set of by-laws were adopted for the Society, a number of addresses and scientific papers were delivered, and three special committees* and the Board of Editors were appointed, in the course of the several sessions of the meeting.

The following officers and Councilors were elected for the biennium 1933-35:

Honorary President: Dr. Oliver C. Farrington, Curator of Geology, Field Museum of Natural History, Chicago, Illinois.

President: Dr. Frederick C. Leonard, Chairman, Department of Astronomy, University of California at Los Angeles, Los Angeles, California.

First Vice-President: Dr. C. C. Wylie, Department of Mathematics and Astronomy, University of Iowa, Iowa City, Iowa.

Second Vice-President: Dr. W. F. Foshag, Curator of Mineralogy, United States National Museum, Washington, D. C.

Secretary-Treasurer: Professor H. H. Nininger, Director, Nininger Laboratory, and Curator of Meteorites, Colorado Museum of Natural History, Denver, Colorado.

*A Committee on Terminology, a Committee on Exhibits, and a Committee on Questionnaires.

Councilors:

Mr. L. F. Brady, Curator of Geology, Museum of Northern Arizona, Flagstaff, and Mesa Ranch School, Mesa, Arizona.

Dr. G. M. Butler, Dean of the College of Mines and Engineering, University of Arizona, Tucson, Arizona.

Professor Raymond E. Crilley, Department of Mathematics, Iowa Wesleyan College, Mt. Pleasant, Iowa.

Dr. F. R. Moulton, 327 S. La Salle St., Chicago, Illinois.

Mr. Henry W. Nichols, Associate Curator of Geology, Field Museum of Natural History, Chicago, Illinois.

Dr. Walter T. Whitney, Department of Astronomy, Pomona College, Claremont, California.

I. List of the Members who attended the Organization Meeting of the Society, held August 21 and 22, 1933, at the Field Museum of Natural History, Chicago, Illinois.

B. Boyd, Department of Mathematics and Astronomy, University of Iowa, Iowa City, Iowa.

L. F. Brady, Mesa Ranch School, Mesa, Arizona.

Mrs. Lois I. Buttles, 10728 S. Artesian Avenue, Chicago, Illinois.

W. S. Buttles, 10728 S. Artesian Avenue, Chicago, Illinois.

R. E. Crilley, Department of Mathematics, Iowa Wesleyan College, Mt. Pleasant, Iowa.

L. D. Hampton, Alabama Polytechnic Institute, Auburn, Alabama.

R. Herr, Crawfordsville, Indiana.

S. Herr, Crawfordsville, Indiana.

F. C. Leonard, Department of Astronomy, University of California at Los Angeles, Los Angeles, California.

H. W. Nichols, Department of Geology, Field Museum of Natural History, Chicago, Illinois.

H. H. Nininger, Colorado Museum of Natural History, Denver, Colorado.

O. Olsen, 4646 Magnolia Ave., Chicago, Illinois.

S. K. Roy, Department of Geology, Field Museum of Natural History, Chicago, Illinois.

J. A. Russell, 655 Funchal Rd., Bel-Air, Los Angeles, California.

C. C. Wylie, Department of Mathematics and Astronomy, University of Iowa, Iowa City, Iowa.

II. Special Committees and Board of Editors appointed at the Chicago Meeting of the Society, August 21-22, 1933.

Committee on Terminology.—H. H. Nininger, L. F. Brady, H. W. Nichols, and C. C. Wylie.

Committee on Exhibits.—W. S. Buttles, M. F. Baumgardt, L. F. Brady, H. H. Nininger, and C. C. Wylie.

Committee on Questionnaires.—R. E. Crilley, J. A. Theobald, W. T. Whitney, and C. C. Wylie.

Board of Editors.—F. C. Leonard, *President*, H. H. Nininger, *Secretary*, C. H. Gingrich, and C. C. Wylie.

(The President and the Secretary of the Society are *ex officio* members of the Board of Editors.)

The first name, in each case, is that of the Chairman of the Committee or of the Board.

THIRD LIST OF CHARTER MEMBERS OF THE SOCIETY

(For the first two lists, see the June-July and August-September (1933) issues of POPULAR ASTRONOMY, pp. 343-4 and 413, respectively.)

Bemrose Boyd, Research Assistant in Astronomy, University of Iowa, Iowa City, Iowa.

Mrs. Lois I. Buttles, 10728 S. Artesian Avenue, Chicago, Illinois.

William S. Buttles, 10728 S. Artesian Avenue, Chicago, Illinois.

Raymond E. Crilley, Department of Mathematics, Iowa Wesleyan College, Mt. Pleasant, Iowa.

George L. English, Mineralogist, Ward's Natural Science Establishment, Rochester, New York.

E. P. Henderson, Assistant Curator of Geology, United States National Museum, Washington, D. C.

Remley Herr, Crawfordsville, Indiana.

Shirl Herr, Crawfordsville, Indiana.

Earle G. Linsley, Director, Chabot Observatory, and Mills College, Oakland, California.

Charles B. Lipman, Dean of the Graduate Division, University of California, Berkeley, California.

F. R. Moulton, 327 S. La Salle Street, Chicago, Illinois.

Henry W. Nichols, Associate Curator of Geology, Field Museum of Natural History, Chicago, Illinois.

Charles P. Olivier, Director, Flower Observatory, University of Pennsylvania, Upper Darby, Pennsylvania.

O. Olsen, 4646 Magnolia Ave., Chicago, Illinois.

Henry Raphael, Galileo High School, 108 Laidley St., San Francisco, Calif.

Leo E. Rogers, 831 N. La Salle Street, Chicago, Illinois.

Sharat K. Roy, Assistant Curator of Invertebrate Paleontology, Field Museum of Natural History, Chicago, Illinois.

John A. Russell, 655 Funchal Rd., Bel-Air, Los Angeles, California.

R. C. Vance, Head, Department of Mineralogy, Ward's Natural Science Establishment, Rochester, New York.

1933 September 1.

Address of the Secretary:

The Nininger Laboratory,
1955 Fairfax St., Denver, Colorado.

Perseid Observations.—The following observations of meteors were made in Madison on the night of August 11:

8:20 to 8:30 C.S.T.	4 meteors	C. M. Huffer
8:45 to 10:25	200 meteors	7 observers (entire sky)
10:25 to 11:25	42 meteors	C. M. Huffer (about $\frac{1}{3}$ of sky)
11:25 to 12:20	24 meteors	C. M. Huffer

Clouded over from SW beginning about 12:00. Moon rose at 9:35. A bright meteor was seen by Mr. Huffer at 7:50 when only 2nd magnitude stars could be seen. The magnitude was estimated to be —5.

C. M. HUFFER.

Madison, Wisconsin, August 16, 1933.

The Perseids.—The Perseids were on time here in Portland. On the nights of August 11 and 12, I saw quite a few of them. Some of them were at the limit

of visibility while others appeared like arc lights and left trails behind. Owing to the fact that I was busy manipulating the telescpes for the benefit of visitors, I missed the majority of these visitors. One of my friends, Mr. McConnell, told me that he had counted more than 40 in one hour on the night of August 11.

ARTHUR JOHNSON.

1310 N. E. 49th Avenue, Portland, Oregon, August 15, 1933.

Fireball Observed.—At 9:15 P.M. Pacific Time, June 14, while watching an electrical display in the eastern sky, I noticed a brilliant fireball, which took about five seconds to travel from R.A. $17^h\ 10^m$, $-24°$ to $17^h\ 20^m$, $-34°$. The magnitude increased rapidly to about 15 or 20 times the brilliancy of Jupiter, and then the fireball vanished.

JOHN E. MELLISH.

1423 San Diego Blvd., Escondido, California.

Notes from Amateurs

First Southern Convention of the A.A.V.S.O.

The first regional convention attempted by the A.A.V.S.O. was held at Fort Worth, Texas, on September 9, and was so definitely successful that the members in attendance voted to make a similar meeting, somewhere in this section, at least an annual affair. The distance record goes to Mr. Adrian Williamson, who flew down from Monticello, Arkansas, accompanied by Mr. Leslie Pomeroy. Mr. Theo. S. Maffitt of Corsicana, Texas, was the next contender in point of mileage, and, while not in fact an A.A.V.S.O. member at the time of the meeting, has since joined.

Personal letters of invitation had been sent to all members within reasonable travelling distance, but because it was known that only a moderate number of them could be expected, all known active amateurs in this region were sent copies of the *Texas Observers' Bulletin* containing a general invitation to attend. Besides the members mentioned above, Dallas was represented by Messrs. B. F. Grandstaff, A. M. Reagan, and James H. Logan; the Weatherford Astronomical Society by Messrs. Witherspoon, Jones, and Bouvard; and Fort Worth by the writer.

About 45 amateur astronomers were at the afternoon session, which began with a general inspection of the display of astronomical equipment, curiosities, and literature: a grinding machine made by Prof. E. E. Vezey of Texas A. & M. College; a crude, but workable, Ronchi test; some solid (Tolles) eyepieces made by Jimmy Peterson of Fort Worth; and a large display kindly furnished through the coöperation of the Astrolab group, including a partly completed polar axis bowl mounting, a very short f. ratio mirror, and numerous intriguing scrapbooks.

Through the courtesy of the Nininger Laboratory of Denver, two specimens of stone meteorites were on display, including a piece of the Melrose, New Mexico, find, said to be the only known meteorite containing definite traces of gold. Two iron meteorites recently found in Lamar County, Texas, were also shown, and (for educational purposes) a number of alleged but false meteorites were on display.

Fortunately, Leon Campbell (A.A.V.S.O. members cannot resist speaking of him thus, informally) started the convention off with a much needed personal contact by wiring us a general greeting, and further unexpectedly provided the opening address of the program by having Dr. L. V. Robinson attend the meeting

and address us on the general topic of "Variable Stars." Dr. Robinson, formerly of the Harvard College Observatory staff, was near Fort Worth at the time, but his courtesy in especially coming to the meeting was greatly appreciated, and his address was an ideal opening for the program.

Mr. Logan next spoke upon "The A.A.V.S.O. as an Organization," sketching the history of the Society and its present general procedure and accomplishments. Mr. Grandstaff, who has only recently had the happy experience of struggling through the task of learning how to locate variables, told the crowd with immense sincerity and some glee (at the thought of similar efforts on the part of his audience) of the troubles of a beginner. Mr. C. A. Howard of the Dallas Astronomical Society, told us of a recent visit to Yerkes and a talk with Dr. Struve regarding the McDonald Observatory soon to be erected near Fort Davis.

At a very informal evening meal, after dinner speeches were omitted in order to adjourn to the Estrellas Observatory, about 15 miles south of Fort Worth. Here partly clouded skies obligingly cleared off and allowed the use of the Robinson 4-inch refractor, lent to the Fort Worth group for variable observing, and also used regularly at the observatory for guiding whea stellar photographs are being taken. With the coming of moonrise, the sky began to pale, and the approach of midnight brought sleepiness even to astronomers, with resulting final adjournment.

OSCAR E. MONNIG.

Fort Worth, Texas, September 21, 1933.

Amateur Telescope Makers of Chicago

The August meeting of the Amateur Telescope Makers of Chicago was held at Mr. Charles W. Eliason's in Winnetka, Illinois, on the evening of August 13. Members having portable instruments were invited to bring them. We had five reflectors, three of six inches aperture, one of eight inches, and one of ten inches. The night was ideal, and the doubles, clusters, and nebulae were given full attention. The spot on Saturn was plainly visible. Mr. Eliason demonstrated the method of making observations of variables. In all it was one of the best meetings we have had and two of our members have sent in applications for membership in the A.A.V.S.O.

The September meeting was held at Mr. Leroy Clausing's place at 5509 Lincoln Avenue, Chicago, on September 10. The subject was "Coating Glass by Evaporation of Metals." Mr. Clausing set up the apparatus and explained the function of the different units. Mr. Alfred Klapperich gave a brief history of the development of the process, compared the reflectivity of different metals and led the discussion which followed.

WM. CALLUM, *Secretary.*

1319 W. 78th Street, Chicago, Illinois, September 14, 1933.

Astrolab Progress Report

Astrolab marks a new development in astronomical organizations. Heretofore anyone interested in observing has been limited to either professional equipment or simple home construction. It is expected that Astrolab will now fill this gap.

Astrolab began as an association of amateurs, and by specializing in committee line-up, wherein talent and training could be used to the most advantage, this hobby of astrophysics has been brought to a comparatively high standard. There is much fine equipment available among its membership—for example, there are eleven lathes. Astrolab has several excellent pattern makers as well as mem-

bers experienced in foundry and machine shop practice.

The design of the Polar Bowl has had the benefit of the coördinated talent of a number of engineers. The experimental model is very smooth in its operation. Photographs, 5 inches by 7 inches, of the sub assemblies will be sent on receipt of some stamps.

Anyone who now possesses a satisfactory mirror and tube can use this declination and polar axis mounting either as an alt-azimuth or equatorial, and secure the rigid smooth motion and light weight characteristic of the Polar Bowl.

The Astrolab open tube uses this mounting as a fork type which requires no counterweights as it is self balancing. The declination bearings are 2½ inches in diameter, long and overhung, so arranged that a camera and finder can both be carried, one on each side of the telescope tube, but not attached to the tube.

The first unit of seven mountings is now under construction. Some of these polar bowls are to be used by various observing groups affiliated with Astrolab, and some will be the property of individuals.

Astrolab invites your correspondence if you are interested in coöperative observation.

L. I. BUTTLES.

10728 S. Artesian Ave., Chicago, Illinois, September 14, 1933.

Zodiacal Light Notes

By FRANKLIN W. SMITH

During recent months conditions in the northern hemisphere have been unfavorable for Zodiacal Light observations because of the southern position of the ecliptic in the summer sky; therefore only a few observations are available for discussion. The night of August 29-30 was quite clear and the Gegenschein was seen at midnight although it was of course still south of the equator. It appeared considerably elongated along the ecliptic; its length was perhaps 10° and its width was scarcely more than 5°. Its eastern edge was near λ Aquarii, and its western edge near θ and σ of the same constellation. The center appeared to be about 1° northwest from the anti-sun. Observations with the surface photometer (mentioned in Zodiacal Light Notes in the August-September issue of POPULAR ASTRONOMY) indicated that the brightness of the center of the Gegenschein was about 7 percent greater than that of the sky background.

The morning Zodiacal Light was observed before dawn on September 18. It extended upward from the horizon in Leo, through Cancer, and into Gemini where it met the Milky Way and hence could not be followed farther. The northern boundary passed a few degrees north of γ Cancri and south of κ Geminorum. The southern boundary passed about half-way between δ and β Cancri.

407 Scott Avenue, Glenolden, Pennsylvania, September 18, 1933.

General Notes

Dr. B. P. Gerasimovic, formerly professor at the University of Kharkov, has been appointed Director of the Pulkovo Observatory, near Leningrad, Russia. Professor Gerasimovič is well known to American astronomers as he has spent several years in research at the Harvard College Observatory.

Dr. L. J. Comrie, Superintendent of H. M. Nautical Almanac Office, Royal

Naval College, Greenwich London S.E. 10, wishes to dispose of a private collection of Star Catalogues, containing about 800 pieces. The collection contains all the more important catalogues published before 1900, and, as far as is known all those published since. It includes the astrographic catalogues. The price is £330, exclusive of freight, packing, and insurance.

The Amateur Astronomers Association whose headquarters are at the American Museum of Natural History, New York City, has arranged an interesting series of popular lectures for the coming winter. They are scheduled for the first and third Wednesdays of each month from October to May.

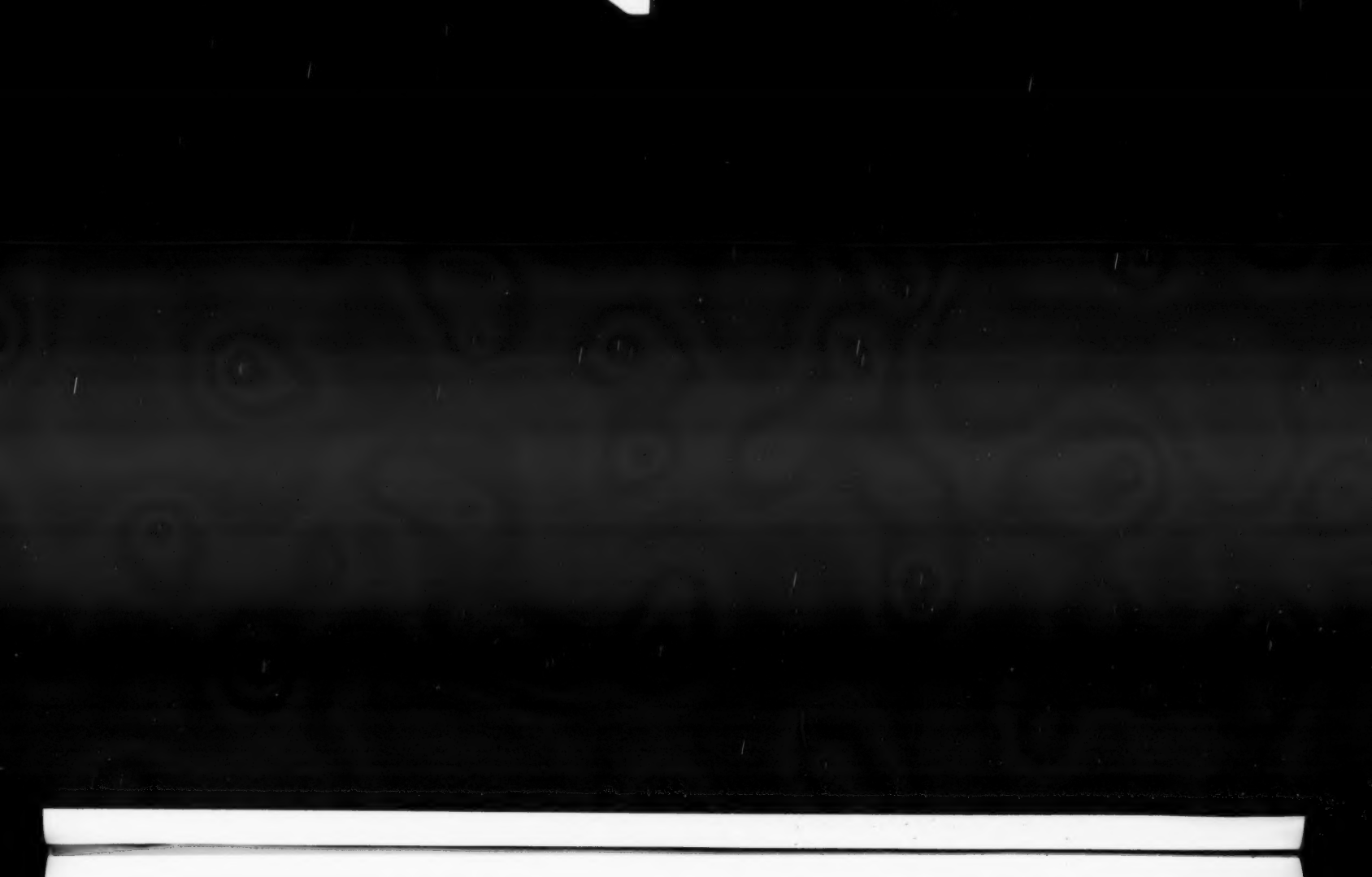
Unpublished Observations of Variable Stars

The publication of the long series of observations of variable stars now being held in various observatories and private libraries would be of very great importance for the study of the changes in the periods of variable stars. Such information would also facilitate the study of changes in the light-curves, and be of value in investigations relating to color and the amplitude of variation of these stars. Although the publication of the total number of observations might be very expensive, nevertheless, a summary of such material might be published without prohibitive expense. Professor Shapley suggested at the meeting of the International Astronomical Union in Cambridge in 1932 that such a summary be prepared and published at the expense of the Union. This proposal was adopted and Mr. Grouiller was instructed to carry out the project.

Mr. Grouiller consequently requests that all persons having such observations send him information as to the specific stars observed, the number of observations, and the method of observation. It should also be stated as to whether and under what conditions a copy of the complete observations would be obtainable. Obviously it is only when all of the observations are taken into account that an exhaustive study of these stars can be made.

Communications should be addressed to Mr. H. Grouiller, Astronomer at the Observatory of Lyons, St. Genis-Laval (Rhone), France.

Book Review

Publications of the United States Naval Observatory, Second Series, Volume XIII.

This octavo volume of 365 pages issued from the Government Printing Office early this year, contains the Results of Observations with the Nine-inch Transit Circle in the interval 1913-1926. The results are presented under three headings: Observations of the Sun, Moon, and Planets; Catalogue of 9,989 Standard and Intermediary Stars: 582 Miscellaneous Stars. An interesting comparison of the positions of 2,438 Standard Stars with the positions given for these stars in other catalogues is given in the final twenty-two pages. The tables are printed in small type and consequently the quantity of material is very large. This volume will be very useful for many years to come to workers in astronomy of position. The volume was prepared under the direction of Principal Astronomer H. R. Morgan, Head of the nine-inch transit circle division.